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QUALITY IN THE CLASSROOM: CLASSROOM ASSESSMENT TECHNIQUES

BY

ELAINE SOETAERT

A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfillment of the requirements for the degree of Master of Education

in

Adult and Higher Education

Department of Educational Policy Studies

Edmonton, Alberta

Spring 1996

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FACULTY OF GRADUATE STUDIES AND RESEARCH

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AK Deane

Professor Art Deane

Dr. David Collett

Tracey Derwing

Dr. Tracey Derwing

April 9, 1996

DEDICATION

I dedicate this thesis to my family: to Martin, for your support through the long struggle that I had with this thesis; to my children, Breanne and Katrina - I know the many evenings you spent alone while mother was in class. I hope that my involvement with this thesis modeled for you the value of education, independence and hard work.

ABSTRACT

This research explored faculty and student perceptions of the effectiveness of the Cross/Angelo Classroom Assessment Techniques (CATs) as a tool for improving the quality of teaching and learning in a postsecondary technical institute and explored perceptions of classroom environment when Classroom Assessment is being applied.

100% of faculty supported the use of CATs as a tool for improving the quality of the teaching and learning experience. Students felt that Classroom Assessment had improved the quality of their learning experience and that CATs is an appropriate quality improvement tool.

This study found no difference in classroom environment between participant classes and the control group. Classroom environment correlated significantly with CATs. Students feel slightly more involved in their learning when exposed to CATs. Females scored significantly higher than males ($p<0.05$) on the scales of Student Cohesiveness, Task Orientation, and Innovation.

Recommendations for encouraging faculty to apply CATs are included.

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I would like to thank the faculty in the Department of Educational Policy Studies who have enriched my learning. I thank Dave Collett for his dry sense of humor that helped me to keep my feet on the ground and keep my enthusiasm tightly reined in so as to embark on a manageable thesis. I thank Tracey Derwing for modeling what a caring professional behaves like in the classroom. Most especially, I thank my advisor, Art Deane for his remarkable ability to impact me, not only in terms of what I know, but more importantly, in terms of how I think. More than once, he opened points of view for me that left me speechless and gave me food for thought for hours. I thank him for his advice and coaching.

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It is said that behind every good man, there is a good woman. Behind this good woman was another good woman. Thank you Margaret Graham for your cheerful support.

I cannot find words big enough or warm enough to thank my family. There were many times when mom was just not there for everyone. Thank you for your patience, Breanne and Katrina. Martin, you plant crops and are proud of what you produce. This thesis will never feed anyone, but it has the same meaning for me as that Canola does for you. Thank you for giving me the time to grow it.

PREFACE

Assessment is an ongoing process aimed at understanding and improving student learning. It involves making our expectations explicit and public; setting appropriate criteria and high standards for learning quality; systematically gathering, analyzing, and interpreting evidence to determine how well performance matches those expectations and standards; and using the resulting information to document, explain, and improve performance. When it is embedded effectively within larger institutional systems, assessment can help us focus our collective attention, examine our assumptions, and create a shared academic culture dedicated to assuring and improving the quality of higher education.

(Angelo, 1995, p. 7).

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CHAPTER I - OVERVIEW OF THE PROBLEM

Higher education is under ever increasing pressure to serve more students, provide high-quality instruction, and produce highly skilled graduates, all with less money. Following in the footsteps of business, higher education is beginning to explore Total Quality Management and the analogous concept of Continuous Quality Improvement as a way of addressing the issue of the demand for high quality instruction during a time of economic restraint (Bogue & Saunders, 1992). Demands for accountability have forced institutions to look at ways "to substantively improve the quality of student learning" (Angelo, 1990b, p. 72). The Classroom Assessment Techniques (CATs) developed by Thomas Angelo and K. Patricia Cross are designed to provide feedback to an instructor about what is, and what is not, being learned in the classroom. For that reason, the techniques allow the instructor to gather "profound knowledge" (Deming, 1986) about which processes are having a positive result on learning and which need improvement. "The purpose of classroom research is to improve the quality of learning in college classrooms by improving the effectiveness of teaching" (Cross & Angelo, 1989). Classroom Assessment Techniques are designed to allow an instructor to improve the teaching and learning process in the classroom.

Introduction

In response to the economic realities of the 90s, postsecondary institutions are exploring Total Quality Management (TQM) and Continuous Quality Improvement

(CQI) initiatives in an attempt to "do more with less" (Bateman, 1993c; Cornesky 1993; Cornesky & Lazarus, 1995; Cornesky, McCool, Byrnes & Weber, 1992; Cornesky et al. 1992; Cross, 1994; Northern Alberta Institute of Technology, 1994; Roberts 1993; Schauerman, 1993). Dr. W. Edwards Deming is credited as being the seminal thinker in Total Quality Management. His work with the Japanese in the years following World War II allowed Deming to crystallize his thinking about management based on data rather than on unsupported judgments. Deming termed this "profound knowledge." In his 1986 book Out of the Crisis, Deming articulated his famous "Fourteen Points of Management." Philip B. Crosby (1979) has a fourteen step plan for improving quality that displays Crosby's faith in the innate desire of employees to do their jobs well. Robert Cornesky (1993) and others (Cornesky et al., 1992a & b, Cornesky & Lazarus, 1995) have been instrumental in writing about the application of TQM concepts to higher education.

Learning management is one of the processes that is critical to any postsecondary institution. There are four phases of learning management: design of the learning process, delivery, feedback, and revision of the learning process (Spaans, 1994) Recognizing the skill, knowledge, commitment and motivation of faculty, postsecondary institutions are challenged to find ways to encourage faculty to increase the quality of the learning process at all four stages (Angelo, 1990a, 1990b, 1994; Cornesky et al. 1992; Cornesky & Lazarus, 1995; Kennedy, 1994; Lund & Brown, 1993; Stetson, 1993). El Camino College in California reports that "the alliance of the Classroom Assessment Project, pioneered by Drs. Patricia Cross and Thomas Angelo, with the philosophy of continuous quality improvement... has finally provided a focus and a forum for the application of TQM principles and practices directly in the classroom" (Schauerman & Peachy, 1993, p. 8). Prior to the recent attention to quality, Sullivan (1985) and Borg (1963) recognized the role of "practical" or "action" research in the improvement of the teaching and learning process. This kind of research is contrasted to the classic definition

of research that is scientific in nature with the view of generalizability. Practical or action research is "systematic gathering of data in an attempt to monitor and to improve the user's own teaching performance" (Sullivan, 1985, p. 75-76). The Classroom Assessment Techniques (CATs) as devised by Thomas Angelo and K. Patricia Cross provide a structured methodology for classroom research and/or assessment.

"Classroom Assessment, as developed by Drs. K. Patricia Cross and Thomas A. Angelo, is a procedure which consists of doing small-scale assessments continuously (and anonymously) in college classrooms by discipline based teachers to determine what students are learning in that class" (Catlin & Kalina, 1993, p. 15).

> The "One-Minute Paper" is a good example of a simple quick (Classroom Assessment Technique) CAT...(it) asks students to respond anonymously to the following two questions at the end of the class period: (1) What is the most important thing you learned in class today? and (2) What question remains uppermost in your mind? (Angelo, 1991a, p. 9).

The purpose of gathering this feedback is to adjust instruction to achieve high quality learning (Cross, 1987, 1990, 1994; Schratz, 1990). This process is one of the basic tools of quality management programs: plan, do, study, adjust. Since the first publication of Classroom Assessment Techniques: A Handbook for Faculty in 1988, the use of the techniques has been growing and receiving praise from faculty using the techniques (Angelo, 1991a). Although very little work has been done in Canada to study the effects of CATs in the classroom, various qualitative studies have been done in the United States to determine the effect of the use of Classroom Assessment Techniques (Angelo, 1991a,b,c; Berry, 1992; Kelly, 1991, 1992, 1993). In 1992, Anita Catlin and Michelle Kalina performed a study that attempted to quantify the effects of the application of CATs on student satisfaction and positive outcomes. Their results supported the previously collected qualitative and anecdotal results of the positive effects of the use of CATs. The results of their study showed a positive effect on the retention of students, their grades

and grade distribution, and the satisfaction expressed by faculty and students about the classroom environment.

Classroom environment was an important variable measured by Catlin and Kalina. "One consistent outcome of classroom environment studies is the relationship between students' sense of cohesiveness and retention and achievement in the classroom" (Catlin & Kalina, 1993, p. 21). Thus it would seem that improved/positive classroom environment is a desirable outcome of the application of Classroom Assessment since it has a direct link to retention of students in class and their achievement in that class. Indeed, for the purpose of this study, classroom environment is assumed to be an indicator of the quality of the learning experience.

Problem Statement and Research Questions

This research explores faculty and student perceptions of the effectiveness of the Cross/Angelo Classroom Assessment Techniques (CATs) as a method of improving the quality of the teaching and learning processes in a postsecondary technical institute. In addition, this research explores faculty and student perceptions of classroom environment when CATs are being applied. To guide the study, the following research questions were addressed:

1. What are faculty perceptions of the appropriateness of CATs as a method of improving the quality of the teaching and learning process?

2. What are student perceptions of the appropriateness of CATs as a method of improving the quality of the teaching and learning process?

3. What are faculty and student perceptions of the classroom environment as measured by the College and University Classroom Environment Inventory

(CUCEI) in a classroom where Classroom Assessment Techniques are being used?

Definition of Terms

Classroom Assessment

> The process of using informal feedback techniques in which data is systematically gathered from students frequently and anonymously about their understanding of course content and reactions to instruction. Classroom Assessment could also include questions about student attitudes and background which may contribute to or impede their learning (Catlin & Kalina, 1993, p. 8).

Classroom Assessment as a proper name includes the entire process as described by Angelo & Cross (1993) including the reporting of the analyzed data to students. Classroom assessment that is not a proper name could refer to any process by which an instructor gathers data about teaching and learning, but does not necessarily include the analysis of the data and the reporting of that data to students.

CATs (Classroom Assessment Techniques)

The small, continuous, and anonymous assessment exercises done in the classroom as described by Angelo and Cross. CATs in the plural form refers to the techniques as a collection of individual techniques.

CAT (Classroom Assessment Technique)

This term refers to one specific technique rather than the set of techniques

Summative Assessment

Summative assessment is usually done at the end of a section of instruction for the purpose of grading student achievement. This term is synonymous with evaluation.

Formative Assessment

Formative assessment is done during the teaching and learning process and gathers information about what the students know and are confused about, or about the process of instruction. Formative assessment is done for the purpose of altering instruction to provide the desired learning outcomes before the summative assessment takes place.

Classroom Research

Classroom Research is the use of Classroom Assessment Techniques to increase the instructor's knowledge and understanding of the teaching and learning process. "It differs from Classroom Assessment in that it usually addresses a hypothesis or research question" (Catlin & Kalina, 1993, p.8). Classroom research that is not a proper name could refer to any process by which an instructor does research in the classroom - not necessarily using Classroom Assessment Techniques.

Feedback

The data gathered from students as a result of the application of Classroom Assessment which provides helpful information to the instructor.

CUCEI

The College and University Classroom Environment Instrument developed by Drs. David Treagust and Barry Fraser at the Curtin Institute of Technology in Western Australia.

Classroom Environment

Shared perceptions of a class of participants of the psychosocial characteristics of the learning environment.

Perception

A person's response to a stimulus. Perception includes the person's interpretation of the meaning of the stimulus in the light of their experience. Perception of an event can vary radically from person to person because of differences in interpretation of the intention, meaning and impact of the event.

Profound Knowledge

Knowledge gained through effective and appropriate gathering and analysis of data. This term is credited to Dr. W. Edwards Deming.

Delimitations

The experimentally accessible population for this study was the faculty and students of a technical postsecondary institution in Alberta, Canada. The sample for this study consisted of ten instructors. For each of the instructors, one class was sampled with the exception of one instructor who had three classes sampled. This instructor had three

sections of the same course and was applying CATs in all three of the classes for consistency. This situation allowed a unique opportunity to include more students in the sample. In addition, there was a control group which consisted of four instructors, one from each division, and one class of each of the instructors. Thus, the total number of instructors involved in the study was fourteen. The total number of classes of students involved in the study was sixteen. The sample instructors consisted of faculty who volunteered for participation in the study and were trained in Classroom Assessment Techniques. The control group of instructors were volunteers solicited by the researcher.

Limitations

This research will be limited by several factors:

1. The ability of the participant faculty to continuously, reliably, and appropriately apply the Classroom Assessment Techniques.

2. The ability of the researcher to manage potential attrition of participants in the study.

3. The possibility of the distortion of results due to the Hawthorne Effect and/or the Pygmalion Effect.

4. The amount of time and energy the researcher and participants have to devote to the study.

Assumptions

The following assumptions underpinned the design and execution of the study.

1. It is assumed that positive classroom environment is desirable and a characteristic of a quality teaching and learning environment.

2. It is assumed that faculty and student participants in the study will respond to questions and surveys honestly and thoughtfully.

3. It is assumed that instructors will abide by the research protocol.

4. It is assumed that instructors will be correctly trained.

5. It is assumed that instructors will apply CATs continuously, reliably and appropriately.

Statement of Significance

This study compared the classroom environments of instructors after implementation of the Classroom Assessment Techniques with classes of instructors who were not trained in Classroom Assessment and were not applying CATs in the classroom. This is a "posttest-only control-group design" (Borg & Gall, 1989, p. 680).

This study is significant because it was done in a Canadian technical institute. This expands the knowledge about the effect of the use of CATs to a previously unexplored context.

This study provided data about the faculty perceptions of the appropriateness and effectiveness of CATs as a quality improvement tool in this educational environment. The institution in which the study took place is one that has embarked on a formal journey to embrace the concepts, tools, and management framework of Continuous Quality Improvement (CQI). This study was an exploration of the suitability of the use of the Cross/Angelo assessment techniques as tools for improving the quality of the teaching

and learning experience in a formal institution of higher learning that is in its infancy in adopting and applying the quality principles. Finding appropriate ways to incorporate CQI and/or TQM (Total Quality Management) into the classroom is a challenge that educational institutions are presently attempting to address.

> Nowhere are the positive outcomes of TQM more needed than in the instructional delivery system - that is, TQM in the classroom. But transferring the TQM principles, concepts, and experience from industry to the classroom is not quite so straightforward and will require dramatic changes in the instructional process; the roles of students, faculty, and nonfaculty personnel; and evaluation processes. (Helms & Key, 1994, p. 97)

The research is of value to the cooperating institution as it explored the process of improving quality in the classroom. It provided data to the institution about the effect of the Cross/Angelo classroom assessment model on classroom environment in this specific context. Perceptions of faculty of the suitability of the use of CATs to this specific context was explored. Data regarding students' responses to Classroom Assessment were gathered and organized to demonstrate the "student as customer" (Tribus, 1994a) response to the use of CATs. This study provided data for decision-making around continued training of faculty in, and implementation strategies of, Classroom Assessment. It provided data to Program Heads, Associate Deans and Deans as they continue to seek new and more effective ways to facilitate the teaching and learning process in their divisions. In addition, past research with CATs indicates that faculty often find the application of CATs to be a factor in the revitalization of their teaching process (Kelly, 1991, 1992, 1993). Individual faculty involved in the study gained information regarding their students' perceptions of classroom environment. Individual faculty had the opportunity to learn more about how their students learn and thus had the opportunity to adjust their instructional methodology to improve the teaching and learning process. In this institution, in a previous study, (Kennedy, 1994) focus groups were used to gather

information about instructor behaviors that lead to a quality learning environment. CATs could provide a tool through which instructors could receive feedback from their students to aid the instructors in their attempts to improve the quality of the learning environment in response to the Kennedy study. This study is of both theoretical and practical significance.

Chapter Summary and Organization of the Thesis

This chapter has set the stage for and introduced the research problem, identified limitations, delimitations, definitions, and assumptions. The chapter outlined the significance of the study, and provides an overview of the remainder of the thesis.

Chapter two will review the literature related to the study. Chapter three will provide a description of the research methodology employed in the study. Chapter four will report the data collected and report themes identified from the analysis. Chapter five will contain a discussion of significant findings and the implications of those findings. Recommendations will be outlined and problems identified for further research.

CHAPTER II - REVIEW OF THE RELATED LITERATURE

Introduction

This research project explores Classroom Assessment in practice from the perspectives of instructors and students as a method of improving the quality of the teaching and learning process. This review is structured in this way to support the questions examined in this research. The review of the literature is divided into a number of major sections. The first section explores the history of Total Quality Management (TQM). Next is an overview of the application of CQI (Continuous Quality Improvement) and TQM to higher education. The third section focuses on the application of CQI and TQM to the teaching and learning process. The fourth section explores the literature and research focused on classroom assessment as a CQI tool followed by a review of the literature that relates to classroom environment and its impact on the teaching and learning process. The next section looks at classroom environment as an indicator of a quality learning environment. A review of the research directly related to Classroom Assessment Techniques follows, both specific practical research and general theoretical research. The final section consists of concluding remarks.

Total Quality Management - An Overview

To begin to understand Total Quality Management (TQM) and its impact on higher education, we need to understand the beginnings of the TQM movement. In the early 1900's, the attention of management was brought to bear on the efficiencies of production. Frederick Taylor is credited with the popularization of "Scientific Management." He was committed to the improvement of the systems of work to maximize production and output. "His vision included a super-efficient assembly line as part of a management system of operations" (Lewis & Smith, 1994, p. 41). He is credited with the focus of experts on the efficiency of movement with the goal of speeding up work. He, much to his chagrin, ignored the human side of work and focused on the task. "Only after painful experiences did he (Taylor) realize that the human factor, the social system and the mental attitude of people in both management and labor had to be adjusted and changed completely before greater productivity could result" (Lewis & Smith, 1994, p. 44). Taylor ceased his experiments in scientific management in 1912, three years before his death, when "he found that human motivation, not just engineered improvements, could alone increase output" (Lewis & Smith, 1994, p. 44).

Walter Shewhart, an engineer, is viewed as the founding father of the Total Quality Management movement. He focused on a systems approach to production with a notion of zero defects. Historically, specification of a product, its production and inspection was viewed as a linear relationship - that is, each process was performed sequentially, in a straight line manner. Shewhart rethought that view and linked the three processes into a circle to reinforce the fact that specification and production are linked - "it is important to know how well the tolerance limits are being satisfied by the existing process and what improvements are necessary...In the Shewhart wheel, the successful completion of each interlocking component led to a cycle of continuous improvement"

(Lewis & Smith, 1994, p. 48). Thus the concepts of Continuous Quality Improvement (CQI) and PDCA (Plan, Do, Check, Act) were born.

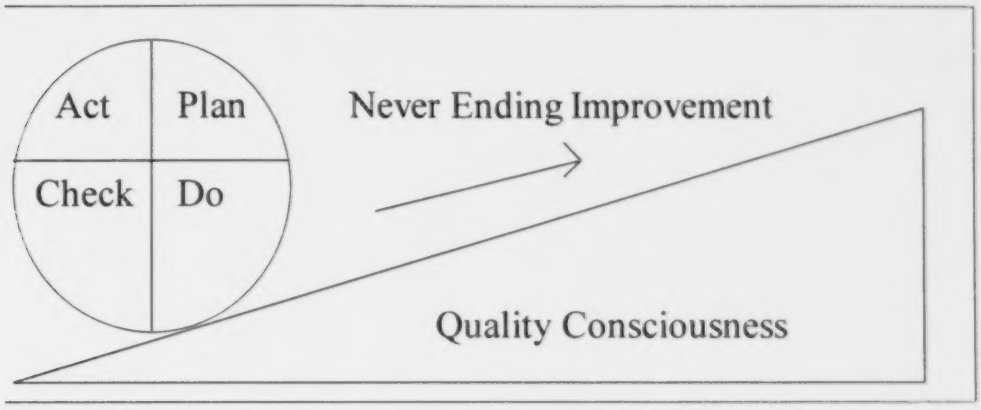

Figure 1 - The Shewhart (PDCA) Cycle

(Seymour D., 1992 , p. 77)

Dr. W. Edwards Deming, is considered to be one of the seminal thinkers of the Total Quality movement. He received his Ph.D. in physics at Yale university in 1927. While he was a graduate student, he was employed doing part-time summer work at the Western Electric Hawthorne plant in Chicago. It was here that he was exposed to sweatshop conditions of the workers and the uncaring and arrogant attitude of management. Here is where he solidified his view that the division of labour between the workers and management was the villain in the production of the sweatshop. The worker was not responsible for the quality of his work - the management was. A worker that produced too many "inferior" products would be fired. This mechanistic view of the worker as only a "part" in the system of production - and a highly unreliable part at that - ignored the human elements of motivation and respect (Lewis & Smith, 1994). Deming and his colleague Joseph Juran, another famous quality "guru," rebelled against the concept of scientific management.

After World War II, Japan set about rebuilding its devastated economy. American and Allied experts were brought in to assist the country's scientists in the rebuilding process. Although Shewhart was asked to come to Japan, he was unable and Deming was solicited to direct the transformation of Japanese industry through the use of statistical process control. The results are self-evident. Japan became a world leader in the production of high quality goods (Walton, 1990).

By the 1970's, America began to feel the competition with the Japanese. Deming returned to the United States and began to teach his Fourteen Points which address the management system and social system (culture) of organizations. He, along with other quality gurus (Juran, Crosby and others), began to educate North America in Total Quality Management.

Joseph Juran was a colleague of Shewhart. His contribution was largely in demonstrating that the entire production chain, from new product design to marketing, had an effect on quality (Seymour, 1992). He was also the first to explore the "costs of quality;" that is, the monetary expense of introducing and using quality concepts (Juran, 1964, 1988).

Philip Crosby is a charismatic and popular speaker for the quality movement. His experience as a corporate vice president for almost fifteen years gave him a base from which to broaden the scope of the quality movement. He encourages managers to "take practical, non-technical steps to improve quality" (Seymour, 1993, p. 10).

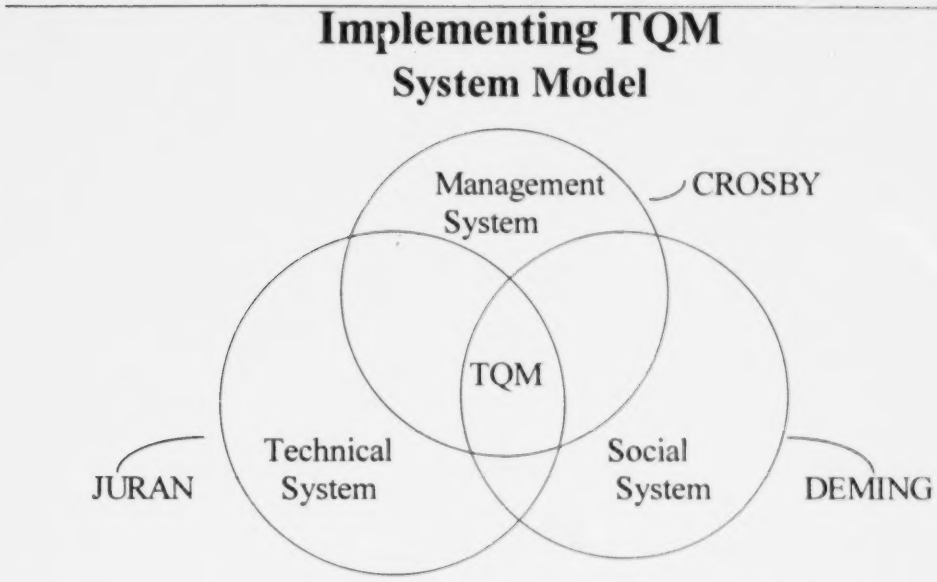

Figure 2 - Implementing TQM - System Model

(Adapted from Lewis & Smith, 1994, p. 33)

Total Quality Management and its Application to Higher Education

Those who deliver education in general and higher education in particular have recently become interested in TQM as a vehicle for creating quality in education. Seymour (1993) postulates that there are four motivating reasons for the adoption of quality in higher education. "(1) survival in an increasingly competitive environment; (2) the escalation of the costs of doing business; (3) a trend to make organizations more accountable for their actions and outcomes; and (4) a blurring of the distinction between 'products' and 'services'" (p. 3). Before we can provide quality in higher education, we need to understand what quality is in an educational environment. Bogue and Saunders (1992) explore many definitions of quality to propose their definition: "Quality is conformance to mission specification and goal achievement - within publicly accepted

standards of accountability and integrity" (p. 20). They define accreditation as the test of mission fulfillment and academic program reviews as the test of goal achievement. They do not, however, describe what quality would look like or the process that would operate in the classroom setting.

Continuous Quality Improvement is one of the pillars of the quality movement. Jablonski defines TQM as "A cooperative form of doing business that relies on the talents and capabilities of both labor and management to continually improve quality and productivity using teams" (1991, p. 4). Embedded in this definition is the concept of Continuous Quality Improvement - the acceptance of "small, incremental gains as a step in the right direction toward Total Quality" (Jablonski, 1991, p.5). Jablonski's strategy for implementation of Total Quality "recommends that employees practice their new-found skills on small, achievable victories to improve processes" (1991, p.5). Many educational institutions have adopted the TQM movement around the rallying cry of Continuous Quality Improvement (CQI).

Achieving a quality culture in an organization takes time. Moving people to a commitment to improving the work they do everyday is a fundamental shift in the way we have come to do business in North America. "In order to succeed (in building a quality organization), we all need to be self critical. If we fail to question our assumptions and values we hold, we will probably fail" (Atkinson, 1990, p. 44). Thus, we need to involve everyone in continuous improvement by challenging everyone to be self-critical.

Unfortunately, in higher education, the application of the philosophy, tools and problem-solving inherent in TQM have been, for the most part, limited to the non-academic processes and systems of the institution (Brigham, 1995). Dr. Daniel Seymour and Dr. Casey Collett engaged in a study of 22 higher education institutions including 14 universities, and 8 colleges to determine the extent that TQM was being applied in higher education. They found "Whether the resistance is real or imagined, participants in the

study, with only a few isolated exceptions, are reluctant to tackle systematic quality improvement efforts that require the active participation of the professorate" (Seymour & Collett, 1991, p. 3). Indeed, Robert Cornesky is of the opinion that "...probably less than 18 institutions of higher education are really practicing TQM from the Boardroom to the Classroom" (personal communication, October 26, 1995). Mentions of TQM efforts on the academic side came from community colleges and the smaller, private institutions. Due to their size, implementation of TQM has been more rapid, and many of them have been involved in the quality movement for a longer period of time (an average of four years for community colleges compared to an average of two years for universities).

Part of the reluctance of the faculty to embrace TQM and/or CQI efforts may be a fundamental problem with the paradigm of the "customer" of education.

> They *(faculty)* might see the student as an input to the process; 'the vessel I try to fill with knowledge.' They might see students as ouputs when they graduate. Students might even be considered co-workers in the system... But some faculty cannot see the student as someone who can competently express his or her educational needs and justifiably insist that those needs be met. (Chaffee & Sherr, 1992, p. 80).

Faculty fear that students expressed needs will be "straight A's and no work." Although this expressed need may be predictable, it indicates a student who does not see value in learning. "Kaoru Ishikawa, a leading Japanese theorist regarding quality, warned that, 'Yes [the] customer is king. But there are too many kings who are blind.' Embracing a customer focus, therefore, does not mean giving out straight A's and abandoning standards" (Turner, 1995, p. 105). Without the paradigm of "student as customer," faculty will have great difficulty implementing CQI/TQM efforts because they will not be open to student feedback - the most important feedback that they can receive regarding quality.

Indeed, educational institutions recognize the importance of student feedback on instruction. Peter Seldin as referenced by K. Patricia Cross (1987) found a substantial growth between 1978 and 1984 in the reliance of community colleges on student evaluation of instruction for evaluating faculty. In that six year time frame, reliance on student evaluation of faculty rose from 50% of the colleges to 67%. The sad truth is that this feedback is not designed to promote improvement of instruction. "It is too late to make changes for the students whose learning is being assessed, and there is seldom a clear link between the assessment data and specific instructional techniques or strategies" (Mellow, Bowen & Hopcroft, 1992, p. 31). Corbett-Lourenco conducted a study in the cooperating institution in 1995 and the students in her study commented "...may not see/have instructor again, so what is the point" (p. 9). Indeed, these students were even skeptical as to whether instructors use the information provided in the student feedback form: "...don't feel instructors act on the information" (p.9). In addition, even if changes are made due to the feedback, they may not be suitable for subsequent group of students. Thus, a change in the methodology and purpose of student feedback is needed. We need to "develop a different approach, specifically designed for what we want to accomplish, namely, the improvement of undergraduate instruction. I believe that it is time to give classroom teachers more responsibility for doing the type of research that will improve their own teaching" (Cross, 1987, p. 12). Alexander Astin in his benchmark book on assessment states,

> Several principles can be applied to ensure that the direct feedback from assessment can be maximally beneficial to the learner. First, the teacher and the learner should both be committed to the shared goal of enhancing talent development and student satisfaction... Feedback should...include *process* data concerning how the learner approaches the task. Feedback should also be optimally timed... Finally, feedback should be considered the result of an ongoing, iterative process (rather than as a one-time activity done at a single point in time) and the institution should specifically recognize the importance of assessment activities in faculty job descriptions and in the personnel review process. (1991, p. 237).

Classroom research encourages the use of the assessment for continuous improvement with an emphasis on process. "Classroom research is a learning experience...it is an ongoing journey whose destination is continually being expanded and extended. Often, the information and tentative conclusions derived in one semester's research ... become the raw material for research in the subsequent semester" (Sullivan & Seery, 1992, p.19).

Overcoming resistance of faculty to the application of the TQM/CQI movement to the classroom is a major challenge for post-secondary educational institutions. One institution, El Camino College states "we are experiencing difficulty with full-time faculty in accepting the TQM philosophy as such, but are experiencing... tremendous success in using a viable alternative strategy, Classroom Assessment Techniques..." (Schauerman & Peachy, 1993, p. 7). Thus CATs is seen as a tool for introducing TQM philosophy into the teaching and learning process.

Since the "reason for being" of an institution of higher education is teaching and learning, it seems reasonable that we should explore the application of quality management principles to the classroom.

Total Quality Management and its Application to the Teaching and Learning Process

When we begin to explore TQM/CQI and its application to the teaching and learning process, we find a number of authors who have explored this application and have provided us with information exploring the history and nature of the quality movement and often offer advice on the implementation process (Glasser, 1990; Kinlaw, 1992; Lewis & Smith, 1994; Murgatroyd & Morgan, 1992; Rubach & Stratton, 1994; Seymour, 1992). However, these authors give little direction on the application of the principles of quality to the classroom. Indeed "CQI has significant implications for the

classroom" (Brown & Jelfo, 1994, p. 3). For information about these implications, we need to turn to authors whose focus has been on the teaching and learning process.

Quality in the delivery of instruction has been an issue for some time and certainly was the subject of discussion prior to the advent of the TQM/CQI movement. "We know, based on decades of research concerning college impact on student learning and development what those basic (quality) behaviors need to be" (Chickering & Potter, 1990, p. 143). The "Principles of Good Practice" were published by Chickering and Gamson in 1987 and are "based on an underlying view of education as active, cooperative, and demanding" (Gamson, 1991, p. 5). The principles are:

1. Encourage student-faculty contact.
2. Encourage cooperation among students.
3. Encourage active learning.
4. Give prompt feedback.
5. Emphasize time on task.
6. Communicate high expectations.
7. Respect diverse talents and ways of knowing.

(Chickering and Gamson, 1987, p. 1).

This set of Principles for Good Practice show some interesting parallels to a set of Fundamental Guiding Principles devised by the cooperating institution. The institution's Quality Council requested a team to examine what quality instructional delivery would look like in the institutional culture and context. The Fundamental Guiding Principles were articulated in the following way:

- The Instructor is committed to the success of all students.
- The Instructor is committed to creating a positive learning environment.
- The Instructor is committed to improving the learning process through real-time feedback.
- The Instructor is committed to encouraging student participation in self-managed learning teams
- The Instructor is committed to incorporating student experience into the learning process
- The Instructor is committed to developing positive interdependent learning and individual accountability.

- The Instructor is committed to offering experiential, practical activities to identify gaps in student competencies.

(Boomer, D., Harrison, K., Hoy, D., Johnson, R., Kachman, R., Manuel, J., Soetaert, E., Smith, G., Trainor, B., Wall, D.; Draft Report to Quality Council, October 23, 1995).

Robert Cornesky and his associates have written prolifically about the application of TQM to higher education. He recognizes the importance of the application of quality principles to the teaching and learning process; "It appears, therefore, that if TQM and TQI (total quality improvement) are to be truly successful at the academy, the professors must not only use TQM and TQI procedures in their classrooms, but they must also be able to teach the students and future practitioners on how to apply them" (Cornesky, 1992, p. 3). He recommends the establishment of a TQI center to, in part, "help faculty develop quality teaching strategies for the classroom" (Cornesky, 1992, p. 10).

Myron Tribus writes about the application of quality management to education. He is adamant that quality management must be applied to the classroom. "...if you're not practicing quality management in the classroom, you should quit saying that you're doing quality management in your school" (Tribus, 1994b, p. 1). He reminds us that there are some

important differences between education and industry.

1. The school is not a factory.
2. The students are not the product.
3. Their education is the product.
4. The customers for the product are several
   a) The students themselves.
   b) Their parents.
   c) Their future employers.
   d) Society at large.
5. Students need to be "co-managers" of their own education.
6. There are no opportunities for recalls.

(Tribus, 1994a, p. 1).

Tribus' point that the student is not the product, but rather their learning is the product of education is reinforced by Miles and Williams (1994). "Shifting the point of

view from the old paradigm of 'students as (external) customer,' to a new paradigm in which the student is an integral part of the university, actually producing the true product of the university, gives us a start in seeing how to use the methods of quality management to improve the quality of our higher educational system" (p. 8). Involving students in the management of their learning process through the use of Classroom Assessment Techniques, flows naturally from this paradigm shift.

Tribus' definition of quality in education is embedded in the context of the classroom environment: "Quality in education is what makes learning a pleasure and a joy" (1994a, p. 6). "In general you do not learn what a customer means by the word 'quality' by just asking. Usually customers do not know. You find out by discussion negotiation and observations of what it is that gives the customer joy and pleasure" (1994a, p. 7). This observation reinforces the need for an exploration technique that will allow the supplier of the service (in the case of the classroom, the instructor) to determine the students' definition of quality. Classroom Assessment Techniques (CATs) as defined by Angelo and Cross is such a tool. "If students are to have joy in learning, it will be because the *style* in which the teaching/learning process is managed conforms to *their ideas* about what is joy" (Tribus, 1994a, p. 9). Applied CATs is a method of managing the teaching and learning process. "If you want to improve the student's achievements, put your attention on the teaching/learning process and not on the achievements in examinations" (Tribus, 1994a, p. 11). Classroom Assessment focuses on the teaching/learning process.

Tribus also examines the social context in which the teaching and learning process is embedded. He states "It is not possible to consider only the set of tools and techniques without considering the social system in which the processes are imbedded" (1994a, p. 19). Thus he proposes a model for changing the paradigm of a person.

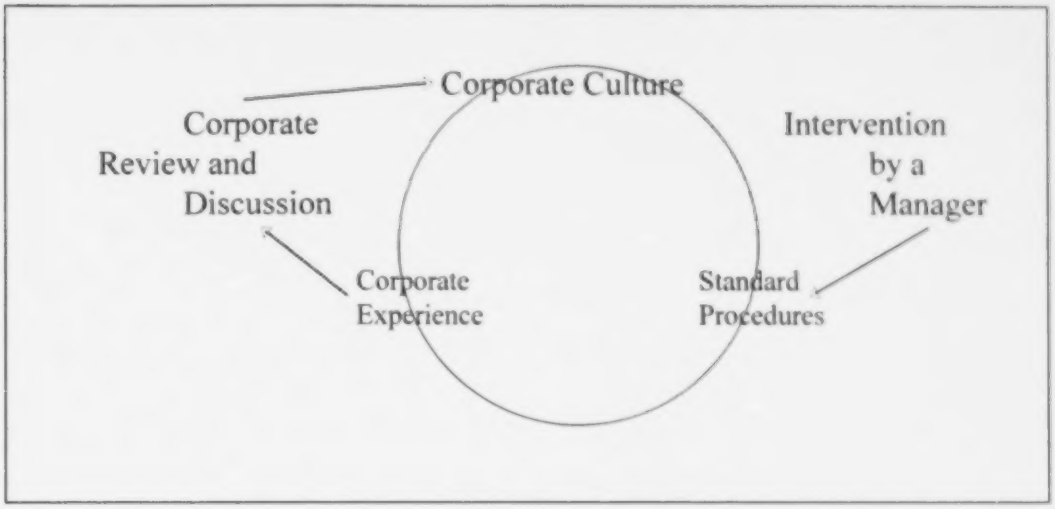

Figure 3 - Changing the Culture of an Enterprise

(Tribus, 1994a, p. 19)

This model "indicates how people are locked into a reinforcing circle unless intervention occurs and an opportunity is afforded for reflection. Instead of the Deming-Shewhart circle of 'Plan-Do-Study-Act' they are caught in a vicious circle of 'Act upon Attitude', 'Gain Experience', 'Reinforce the Attitude'. It requires intervention to break the cycle" (Tribus, 1994a, p. 20). This model supports the concept of a staff training process consisting of an intervention - a workshop - followed by the experience of applying the training supported by the discussion with peers. This model is recommended by those that have implemented the Cross/Angelo techniques in community colleges (Catlin & Kalina, 1992).

Jane Fraser and a group of her colleagues at Ohio State University have been redesigning an introductory course to engineering economy and during that process have delineated the parallels between quality and Adult Learning Theory (Table 1). The commonalities are remarkable and provide a strong impetus for the implementation of quality concepts and tools to the teaching and learning environment.

Table 1 - Congruence of TQM and ALT

Total Quality Management	Adult Learning Theory
top management sets commitment	teacher creates environment
continuous improvement	lifelong learning
self management	self-directed learner
quality is defined by the customer	adult learners know what they need
people want to work	people want to learn
workers should run their own teams	learners should plan their own learning
self managed work teams	student work groups
greater focus on intrinsic rewards	recognition of higher order needs
worker can contribute	students can contribute
workers have experience	students have experience
drive out fear	create friendly environment of adultness
customer orientation	student orientation
cease dependence on inspection for quality	cease dependence on grades
quality is a shared responsibility	learning is a shared responsibility
quality must be operationalized and measured	competency must be defined and assessed
measurement is feedback for improvement	assessment is feedback for improvement
equip workers with problem solving skills	equip students with learning skills
people need help learning how to function in teams	people need help learning how to learn in groups
works best with self-directed, empowered adults	works best with self-directed, empowered adults
employees are one set of customers	students are customers but also co-producers of learning

Total Quality Management	Adult Learning Theory
traditional quota system is a deterrent to quality	traditional grading system is a deterrent to learning
manager works for worker	facilitator helps student
place person in right job	adapt to student's learning style
workers diagnose causes of quality problems	adult performs self diagnosis of learning needs
experiment can isolate causes of problems	diagnostic experiences can help adult learners discover gaps in competencies
inspection at end is too late	testing at end is too late

(Reprinted with permission: Fraser, J., Colburn, M., Lundquist, R., Mount-Campbell, C.A., & Smith, G.L. Jr. (1994). A new paradigm for curriculum redesign: A demonstration in engineering economy. 1994 American Society for Engineering Education Annual Conference Proceedings.)

Applying the principles of TQM to the classroom requires an analysis of the principles and application of those principles to the unique context of the classroom. When creating an Organizational Behavior Course to be managed from a TQM perspective, Jose Eulogio Romero-Simpson, analyzed the TQM literature to extract the principles with a view to applying them to the classroom experience. These principles restated in an educational context became:

1. An orientation to the customer (student);
2. Commitment of management (instructor) to quality and willingness to accept the responsibility for the system's "well-being" and improvement;
3. The crucial role of education and self-improvement for accomplishing any type of change;
4. The spirit of "KAIZEN," or constant improvement through efforts of the entire work force (students and instructor);
5. A process orientation, as opposed to product orientation;
6. The importance of a stimulating environment, free of fear;
7. A teamwork approach;
8. The use of communication rather than inspection to overcome obstacles, improve the system and achieve quality;
9. The relevant role of statistical thinking and the use of traditional/ad hoc tools to measure/reduce variation; and

10. A personal commitment of each author to the diffusion of TQM rooted on a conviction of its value. (Romero-Simpson, 1992, p. 81).

When applied, the principles manifested into a team structure with a heavy emphasis on feedback.

> The students then form teams...The teams work on the course, periodically holding feedback sessions to evaluate the course on eight factors: absence of fear, usefulness of what is being taught, responsibility for own learning, improvement in problem-solving skills, tests, teamwork, usefulness of exercises, and effectiveness of the media used.
>
> The professor then compiles the students feedback into histograms, control charts, and other analysis tools, sharing the results with the students. The course is modified and refined based on the feedback" (Bemowski, 1991, p.39).

It is interesting to note that the proper application of Classroom Assessment Techniques supports all of the instructional guidelines. The feedback gathered during the course could be gathered using CATs. Sharing the results with students and involving them in the modification and refinement of the course is an integral part of Classroom Assessment. Cross and Angelo (1993) have included an assessment in their text based on the team structure and derived from the Japanese concept of Quality Circles. The approach is more general than that described by Bemowski, but the process is the same.

Another example of TQM principles being used in a business classroom can be seen in the work of David Fearon and colleagues, at the Central Connecticut State University and R. Ivan Blanco and others at Barry University in Miami. Prompted by feedback from employing customers in an invitational forum held in 1990, they began to restructure the learning experiences of their students into a quality management context.

> Quality thinking in the planning, control, and improvement of student learning recasts every aspect of our classroom - the basic academic work system. Managing our entire instructional system for quality cuts us loose from many academic conventions of classroom teaching. In ways the business world is becoming more competitive on the basis of quality - by dislodging, refocusing, and replacing many of the 'usual' operating practices - we are changing how, and even why, students learn from us.

> Three years into our quality teaching journey we notice heartening gains in classroom performance reflected mainly in the stated constructive outlooks of our undergraduate Management majors as continuing learners. Our long-range goal is that students with whom we are learning with quality will be found by their co-workers to be distinctively versatile, yet disciplined participants in continuously improving what matters for total organizational success. Short-term results are apparent mainly in heightened student interaction in many aspects of learning (Fearon & Blanco, 1993, p. 4).

In their paper describing their experience with a TQM managed classroom, Fearon and Blanco outline practices and results occurring in the classroom from quality planning, quality control, and quality improvement perspectives. It is interesting to note that in the quality control perspective, they outline the practice of "Continuous course/team/self improvement goals for students and professors alike. Each course (is) launched as a 'work in progress' and shaped through *feedback* with students doing much of the system and process changing" (Fearon & Blanco, 1993, p.10). Feedback is a crucial component of the continuous improvement system.

Application of CQI principles to the classroom often manifest in a teamwork approach used by the students in their learning (Baugher, 1993, Courtney, 1992, Kimbler, 1994; Kunz, 1995, McDougall, 1985) or in the use of faculty teams for presenting instruction (Hubbard, 1994). This use of teamwork often operates contiguously with continuous assessment of the teaching and learning process (Kunz, 1995). "Project LEARN" at Samford University (AL) and Belmont University (TN) is a process whereby student teams "design, administer, and evaluate feedback measures and implement solutions" (Baugher, 1993, p. 3). The use of CQI/TQM principles in the classroom can cause instructors to implement innovative grading practices (Aamot, 1995; Byrnes & Cornesky, 1994; Chaytor, 1995; Kachurick, 1994; Kimbler, 1994; Kunz, 1995; Langford & Cleary, 1995; Lamkin, 1994), classroom "mission setting" and other such TQM practices. The application of TQM principles to a classroom setting, in practice, is a continuum whereby the classroom can appear to be traditional with some use of teams or continuous assessment to a classroom that begins with the students defining their mission

statement and moving through the coursework as teams that then evaluate their product (learning) and process through peer evaluation. Implementing the principles requires understanding and commitment on the part of the instructor and a degree of skill.

David Dozark (1994) summarizes

> the factors that must be considered when implementing TQM in the college classroom:
>
> 1. Learning processes are widely varied and many are not well understood.
> 2. TQM is not an end in itself, but rather a means for improving processes. It is not clear whether it is an effective method of increasing the understanding of learning processes.
> 3. Quality must be defined by the customers and there are many customers. Consequently, there is no single definition for quality in the college classroom.
> 4. A TQM classroom has characteristics which differentiate it from a non-TQM classroom.
> 5. TQM in the classroom affects the attitudes of those involved.
> 6. Embracing TQM in the classroom requires a paradigm shift for all concerned.
> 7. Alternative methods of assessment and evaluation will be required in the TQM classroom.
>
> (p. 11 - 12).

Classroom Assessment as a Continuous Quality Improvement Tool

The literature dealing with the application of TQM principles to the classroom deals with many aspects of the teaching and learning process and quality principles. The process of assessment is one that is common to teaching and learning and Continuous Quality Improvement. In these contexts "assessment is seen as developmental, as ongoing and continuing. It takes not a snapshot but a moving picture" ("Assessment: What Should It Mean?" 1994, p. 4). "Classroom Assessment brings assessment into the classroom and joins assessment to the improvement of learning" (Cross, 1993, p. 17). Classroom Assessment Techniques, as well as other feedback mechanisms, have been used to improve the teaching and learning in a number of instances in the recent past.

Michael Schratz in his paper entitled ""Researching While Teaching: A Collaborative Action Research Model to Improve College Teaching" recognizes that "teaching practices soon become routine and remain at the same level once established" (1990, p. 99). In an informal study at the University of Innsbruck, faculty were introduced to "Schon's concept of *reflection in action* (1983, 1987) and *action research*. Under this program, an initial consultation would be followed by a continuing process of critical reflection aimed at improving professional practice" (1990, p.100). The project was entitled Researching While Teaching (RWT), and employed all of the steps of classroom research as described by Angelo and Cross with the exception of the "closing the loop" done by reporting to students the results of the data collection in the classroom. The RWT model included small faculty group exchanges of information, and support of one another's assessment work analogous to the small groups recommended when introducing CATs to a college (Catlin & Kalina, 1992). The RWT pilot project was a success. "After assessing the RWT pilot project at the University of Innsbruck, we concluded that the action research approach to teaching in higher education is a valuable experience" (Schratz, 1990, p. 107).

The LEARN process as applied at Samford and Belmont universities is focused on the improvement of teaching and learning. The title of the steps in the process create the acrostic LEARN. Student teams work through the steps in a basic process improvement model:

- Locate an opportunity for improvement
- Establish a team to work on the process
- Assess the current process
- Research the root causes
- Nominate an improvement and enter the Plan-Do-Study-Act (PDSA) cycle

(Baugher, 1993, p. 3).

Student groups communicating feedback for instructor/instructional improvement is also used by in the "Alliances for Change" procedure described by Tiberius, Sackin, Janzen & Preece (1993).

> Pairs of teachers are invited to form 'partnerships' for the purpose of teaching improvement. Each partner gathers information from a random sample of students drawn from the other's class, called the 'Agenda Group' and then summarizes the information in a report. The two partners exchange and discuss their reports. Each teacher then takes her or his own report (i.e. describing her or his own teaching) to a *second* group, composed of a *volunteer* group of students from the teacher's own class who respond to a request to help the teacher. It is this face-to-face, teacher-student discussion group, called the 'Conversation Group' that is the central feature of (the) procedure. Members of the conversation group read and discuss the report with the teacher. (Tiberius, et. al., 1993, p. 12-13).

This process is analogous to the Quality Circles assessment procedure described by Angelo and Cross (1993, p. 339) and Classroom Management Teams (Nuhfer, and others, 1995). Quality Circles were implemented by Philip Cottell, Jr. in his accounting classes as " ...an effective way to monitor and improve the quality of student learning" (1991, p. 43).

George Bateman and Harry Roberts (1993a & b) at the Graduate School of Business at the University of Chicago have been promoting the use of TQM principles in the classroom. An original "lab course" existed that had "teams of students work(ing) with companies to develop and implement new product ideas. Faculty and executives from client companies coached the students" (1993a, p. 2). Based on this concept "Business 712, The Laboratory to Achieve Organizational Excellence: Improvement of Teaching, Curriculum, and Research" (1993a, p.2) was created for students to advise client faculty in the improvement of teaching. The students experimented with various forms of feedback mechanisms to "tell the instructor, continually and quickly, what is and what isn't working...so that the instructor can make appropriate adjustments quickly" (1993a, p. 2) The most effective mechanism "turned out to be a simple fast-feedback questionnaire, used at all or almost all the class sessions" (1993a, p.2). The similarity

between the fast feedback questionnaire and the CATs "Minute Paper" is remarkable. "The questionnaire's goal is to get systematic feedback after every class meeting, analyze the results, and make appropriate adjustments" (1993b, p. 3). This is the Plan-Do-Check-Act cycle in operation in the classroom. Ronald Turner (1995) writes of his experience with feedback forms leading to improvement of the instructional process.

> For example, I showed a film that took an entire class period. The next class, I conducted a discussion about the film. The discussion proved to be a dud. The students' feedback suggested I stop the film every 10 minutes to discuss that 10-minute segment. I tried this the next time I showed a film, and the response was enthusiastic...Taking time to collect student feedback hasn't cost me instruction time. Rather, the suggestions I get save me time by improving my teaching effectiveness. I spend less time going back over materials that students didn't understand the first time (p. 107).

As Jean Lamkin worked at implementing TQM ideas into a graduate course, she used "Post-It™" notes to gather feedback quickly, and anonymously from students.

> One method I use for getting input is to draw a 'Parking Lot' on the board. The parking lot is a one-yard, square box divided into four smaller boxes. I label the boxes Ideas, Comments, Questions and Other. I place a pad of Post-It™ notes on the chalk tray and tell the students to feel free to make comments as they see fit. When I see a note on the parking lot, I check it out and respond as appropriate (1994, p.7)

As well as this form of continuous assessment, Ms. Lamkin used "memo's" and "fan letters" to seek out the muddiest and clearest points respectively of each class period. She was applying CATs while using a different term for the process. She finds that she has "taken (her)self out of the center of the course and placed the focus on the students. What they learn in the class depends more on their performance, than on mine" (p. 8). Her experience echoes the comments of educators using CATs who find that their students begin to take more responsibility for their own learning.

Ronald Turner, an Economics Instructor at Eastern Maine Technical College uses a questionnaire that he administers at the end of every class that asks about students' perceptions of the quality and value of that class. Again an example of instructor using

Classroom Assessment, but not labeling it as such. "The student feedback is anonymous, in order to reduce their fear of my retribution" (1994, p. 3). Here we see the anonymity which is embedded in CATs wedded to Deming's principle, drive out fear.

John Kachurick in his incorporation of TQM in the classroom used SPCExpert, a shareware program that generates control charts to develop a control chart for test grades. He "took the control chart into class, discussed the results and asked for input. Using a cause-and-effect diagram, the students identified a number of potential causes for low performance, isolating one -- the instructor covered the material too quickly" (1994, p. 3). Even though Kachurick "attributed the poor performance to student laziness and lack of motivation" (1994, p. 3) he slowed his instruction and was "surprised when (he) found that the test scores did increase substantially" (1994, p.3). As a result of this experience, Kachurick intends "to re-evaluate the 'required' material before the course is offered again with an eye toward reduction" (1994, p.3). This is an example, in context, of the discussion of assessment with students leading to an improvement in a course.

Angelo and Cross (1993) outline the assumptions upon which their form of Classroom Assessment or Classroom Research are based. The congruence of these assumptions with TQM/CQI philosophy is remarkable.

> Assumption 1: The quality of student learning is directly, although not exclusively, related to the quality of teaching. Therefore, one of the most promising ways to improve learning is to improve teaching. (p. 7)
>
> Assumption 2: To improve their effectiveness, teachers need first to make their goals and objectives explicit and then to get specific, comprehensible feedback on the extent to which they are achieving those goals and expectations. (p. 8)
>
> Assumption 3: To improve their learning, students need to receive appropriate and focused feedback early and often; they also need to learn how to assess their own learning. (p. 9)
>
> Assumption 4: The type of assessment most likely to improve teaching and learning is that conducted by faculty to answer questions they themselves have formulated in response to issues or problems in their own teaching. (p. 9)

Assumption 5: Systematic inquiry and intellectual challenge are powerful sources of motivation, growth, and renewal for college teachers, and Classroom Assessment can provide such challenge. (p. 10)

Assumption 6: Classroom Assessment does not require specialized training; it can be carried out by dedicated teachers from all disciplines. (p. 10)

Assumption 7: By collaborating with colleagues and actively involving students in Classroom Assessment efforts, faculty (and students) enhance learning and personal satisfaction. (p. 11).

Classroom Environment and Its Impact on the Teaching and Learning Process.

Classroom environment has been extensively researched over the past two decades. Based upon earlier work by Lewin (1936), Murray (1938) and Pace and Stern (1958), leaders in the field of classroom environment have created a large body of work that proves that the "quality of classroom life...is important and deserves the serious attention of researchers and educators" (Fraser, 1991). "The perceived environment varies from individual to individual, and everything we do as teachers has an impact on this affective environment" (Heimlich & Norland, 1994, p. 90). Comprehensive overviews of this research are referenced by Fraser (1991) to include articles by Fraser (1986), Fraser (1989), Fraser and Walberg (1991), Moos (1979) and Walberg (1979). These overviews "clearly show that psychosocial characteristics of classroom learning environments demonstrate incremental validity in predicting student achievement, can be cross-culturally replicated, are useful in curriculum evaluation studies and can provide teachers with useful information to arrange more optimally functioning classrooms" (Ellett, Loup, & Chauvin, 1991). More recently (Vahala & Winston, 1994), students perceptions of classroom environments have been shown to vary "depending on institution type and academic discipline and that perceptions of environment differentially affect... students' grades in each discipline area" (p. 99). Such information can support an institutional or program reform such as adopting a program of Continuous Quality Improvement.

Instruments to assess classroom environment have been used as "sources of predictor and criterion variables in a variety of research studies conducted in primary and secondary schools" (Treagust & Fraser, 1986). Despite a strong history of classroom environment research being conducted at the public school level, very little research concerning classroom environment at the post-secondary level was conducted prior to 1986. Treagust and Fraser postulated that this lack of research could be due to the absence of a suitable instrument with which to measure classroom environment at the post-secondary level. Consequently the College and University Classroom Environment Inventory (CUCEI) was developed. Validation of the final form of the inventory included students in a variety of disciplines in multi-purpose educational institutions in Australia as well as students in a university in Illinois, USA. The CUCEI was determined by the researcher to be a suitable instrument for this study.

Past classroom environment research has investigated the association between student learning outcomes and their perception of the classroom environment. The research includes a wide variety of settings and contexts. Williams (1990) has reviewed the literature and found that the classroom environment perceived by female students in post-secondary learning institutions affects their participation in class. Horvath (1992) studied persistence of female students in an introductory economics course and concluded that female students need to overcome classroom climate. Bonsangue (1995) has examined minority students' success in Calculus and suggests that "persistence and success are more related to college classroom experiences and expectations than to pre-college preparation" (p. 23). Gainen (1995) identified "chilly" classroom climate as a barrier to success for college freshmen entering majors in science, mathematics and engineering. Johnson & Walberg (1989) examined the applicability of Walberg's model of educational productivity to a community college setting. Among other variables, they found that social context of the classroom had positive effects on students' grade point averages. A study which explored the emotive and social aspects of an English as a

Second Language (ESL) class for adult Japanese women showed that the opportunity in the class for a student to reflect about her feelings towards her learning had a positive effect on her ESL learning (Swain & Miccoli, 1994). Terenzini (1993) surveyed 210 students and results showed that what happens to students in the class-related experiences in a post-secondary situation made a statistically significant and unique contribution to the explanation of variations in intellectual orientation.

The work of Uri Treisman at the University of California, Berkeley is an interesting contribution to the body of literature that relates classroom environment, cooperative or team learning and feedback to positive student outcomes for Black students in introductory Calculus. When charged with the problem of why Chinese students do well in introductory Calculus and African American students do not, he eliminated the hypotheses that faculty put forth as possible explanations such as lack of parental support, poverty, poor preparation, lack of motivation etc. In desperation, he spent time with the students and found that the Chinese students studied in groups whereas the Black students studied alone. As a result, the Black students did not get feedback from their peers, experience with discussing problems, insight into novel ways of thinking about a problem, etc. Thus, the Mathematics Workshop was born with its primary purpose to improve the deficiencies in minority students' mathematics and study skills in part by building a community of minority freshmen that become a source of peer support (Treisman, 1983). The workshops have been operating successfully since 1982 and have been replicated elsewhere (Fullilove & Treisman, 1990; Garland & Treisman, 1993; Treisman, 1992). The development of classroom cohesiveness and feelings of companionship in the classroom obviously led to the success of the workshop and its students.

"The practical implication from this research is that student outcomes might be improved by creating classroom environments found empirically to be conducive to learning" (Fraser, 1991, p. 7). If the use of Classroom Assessment Techniques can be

shown to contribute towards the creation of a positive classroom environment, then there is strong evidence to suggest that CATs should be practiced consistently in the classroom for the purpose of creating a "quality" learning environment.

Classroom Environment as a Measurement of Quality

Investigations into classroom environment are important as indicators of a quality learning environment. Tribus (1994a) reminds us that quality in education is that which makes learning a pleasure and a joy. Romero-Simpson (1992) speaks of a quality educational environment as one that is stimulating and free of fear. Indeed,

> examining classroom learning environments is important because it emphasizes the student-mediating or student cognition paradigm (Knight & Waxman, 1991; Wittrock, 1986). This paradigm maintains that how students perceive and react to their learning tasks and classroom instruction is more important in terms of influencing student outcomes than the observed quality of teaching behaviors. (Waxman, 1991, p. 1).

Classroom environment instruments (such as the CUCEI) can be used to monitor the implementation of innovations in the teaching and learning process. Fraser and Fisher (1986) demonstrated the use of a classroom environment instrument being used in the "check" step of the PDCA (Plan, Do, Check, Act) cycle. They assessed the perceptions of the environment of a class. The teacher examined the evidence and introduced an intervention to improve a component of the classroom environment. The instrument was readministered to see whether students had changed their perception of classroom environment. This case, as well as experience with the PDCA model suggests "the potential usefulness of teachers employing classroom environment instruments to provide meaningful information about their classrooms and a tangible basis to guide improvements in classroom environments" (Fraser, 1991).

Research Investigating the Cross/Angelo Model of Classroom Assessment

There are two types of research being done with the Cross/Angelo model of classroom assessment as their focus. The first is research that has a "micro" point of view. This is research being done *using* Classroom Assessment Techniques to improve the teaching and learning process. This could be categorized as "action," "practical," or "classroom" research. From this research, we gain qualitative, first hand reports by practitioners in the classroom, of the benefits of the use of CATs in specific contexts. A number of these reports are summarized in the following section.

The second type of research is that which focuses on the effect that the use of CATs as the independent variable has on various dependent variables such as student retention, grades, and other quantifiable data. This research is at the general, theoretical, "macro" level. It "tends to be carried out by professional researchers and should involve the use of a theoretical framework, large numbers of subjects, sophisticated measuring instruments, careful analyses of data and logical interpretation of results" (Sullivan, 1985, p. 71). One of the goals of this type of research is generalizability. The remainder of this chapter will focus on this type of research.

"Specific Practical" Research

There is a wealth of information about the success of individual, contextual, Classroom Research using CATs (Angelo, 1990, 1991a,b,c; Angelo & Cross, 1993; Anthony, 1991; Berry, 1992; Brown & Jelfo, 1994; Fideler, 1992; Malinowski, 1994). Indeed, in Angelo and Cross' 1993 edition of the text Classroom Assessment Techniques there are two examples of each of the fifty assessments being used in practice. For the purpose of this thesis some representative examples will be described.

David Nakaji (1991) was interested in exploring the "cognitive processes underlying students' visualization and problem solving in physics" (p. 79). After being trained in Classroom Research and CATs, Nakaji participated in a pilot project on Classroom Research. He and his students spent time examining the visualization process students use when faced with a physics problem. Nakaji and his students became

> more aware of the importance of images and their role and function in problem solving... Informed by this awareness, students report spending more time setting up the problem through visualization before reverting to the mathematical representations... With practice, students also demonstrate an increased ability to change frames and perspectives while visualizing, thereby enlarging their repertoire of problem-solving skills. Finally, since they are continually asked to monitor their own thinking through exercise...students will become more proficient at and more comfortable with metacognitive activities. (p. 86).

Thus, Classroom Research can be used to explore metacognitive function and to improve on it.

Elizabeth Berry (1992) describes an example of an instructor whose students were frustrated trying to understand "legalese" in cases in a law class. The instructor

> assigned the first law case in the book as homework. The next class session she distributed an ungraded questionnaire to see how much students understood about the case. She collected them and analyzed them for common problems. Then she gave a lecture and handouts on 'How to Read A Law Case,' illustrated by her own notes on the case (Berry, 1992, p. 4).

This is an example of gathering information about students' understanding and modeling thinking to improve the students' ability to analyze and understand material.

James Sullivan and Helen Seery (1992) describe their experience with the Massachusetts Bay Community College's Teaching/Learning Project.

> As two members of the mathematics faculty, we are engaged in research spanning classes from Basic Math to Calculus. Past and current projects include a diverse range of topics, such as the role of prior knowledge as the bridge to new learning, effective collaborative learning techniques, problem-

> solving strategies, the use of graphing calculators, and methods for increasing students' awareness of their role in the own learning...
>
> We derive great satisfaction from our efforts to improve the teaching and learning environment of our classrooms...
>
> Classroom research forces us, by choice, to document, revise, reconsider, interpret, share with and learn from others. Each class is the beginning of a process of investigation and self-renewal. (p. 11-12).

They have investigated many aspects of teaching and learning in mathematics and have learned from their investigations. Sullivan reports a time when he asked his students to pretend to write a note to their best friend to explain what a derivative was and discovered, to his dismay, that only a very few students could adequately explain the term. This prompted him to review the concept and the student responses on the test that followed were much improved. This is an example of a gap in learning being closed in response to assessment.

Bob Morris (1994) writes of his experience with the group of assessments Angelo and Cross (1993) call mini-evaluations.

> These techniques ask for immediate feedback on teaching, testing, and assignments. While I did get some good suggestions from the students, the value of these CATs is that they establish a different relationship between the instructor and the students. Because the students get to evaluate and suggest changes in the course while they are still there, they have a different attitude toward the course and toward the instructor (Morris, 1994, p. 17).

Here we have an instructor who sees a change in the classroom environment due to the use of CATs.

Jacque O'Lea (1991) reports that the use of CATs in his Continuing Education ESL (English as a Second Language) class had marked benefits for his ethnic students. "The background of the students is extremely varied, but quite often includes many 'at-risk' students whose previous academic experience is either quite limited or has been

negative. These students seem to blossom when they are given the opportunity to provide and receive immediate feedback" (p. 3-28, 3-29).

This anecdotal evidence of the positive effects of CATs on the teaching and learning process prompted researchers to look at the effect of Classroom Assessment and Classroom Research in a more general theoretical manner with a view of generalizing the results.

"General Theoretical" Research

Research has been done investigating the effects of Classroom Assessment and Classroom Research on various dependent variables: retention and grades (Catlin & Kalina, 1993; Kelly, 1991, 1992, 1993; Obler et. al. 1991; Olmsted, 1991; Stetson, 1991; Walker, 1991), classroom environment (Catlin & Kalina, 1993), class completion by gender and ethnicity (Catlin & Kalina, 1993; Obler et al. 1991), emphasis of Classroom Research by teachers (Cuevos, 1991), and the extent to which CATs can lead to improved student learning (Malinowski, 1994; Steadman, 1994; Walker, 1991).

In 1988, The College of Marin (COM) embarked on a pilot project, training faculty in the use of Classroom Research. As Nancy Stetson reports (1991)

> From fall 1988 through spring 1991, sixty-nine faculty members completed at least one semester in the Classroom Research program at COM...During the semesters they were involved in the program, these sixty-nine faculty members involved at least 3,500 of their students in Classroom Research projects (p. 122).

With such a wealth of experience, it was with great interest that COM asked the questions "Did the COM Classroom Research program affect teaching? Did it affect student learning?" (p. 122). The College of Marin found that "experienced Classroom Researchers reported that they had incorporated Classroom Research into their normal pedagogy...(and) that their projects immediately affected their teaching in a variety of

positive ways" (p. 123). While addressing the question of the effect of Classroom Research on students, Stetson found that

> While Classroom Researchers often expressed their strong belief that students in classes where they were using Classroom Research were more successful than their other or previous students, there were only a few instances where COM's research could support their impressions with evidence of significantly improved class grade averages or retention rates (p. 123-4).

An explanation for this discrepancy between perception and quantifiable evidence, is that

> Many Classroom Researchers focused their inquiries on developing metacognitive skills, critical thinking, or self-esteem, but did not test or grade students on those elements. If this...hypothesis were true, it would mean that student learning could improve in important ways without necessarily registering on the usual tests or affecting grades (p. 124).

Perhaps the most significant effect of the Classroom Research Projects reported by Stetson is the effect that CATs and Classroom Research had on the teaching practice of faculty at COM. "...faculty reported many observable ways in which students were more actively involved in learning, received prompt feedback, and had more contact with instructors - examples of three important and well-established principles for effective student learning" (p. 125). These well-established principles are articulated by Gamson and Chickering's "Seven Principles for Good Practice in Undergraduate Education" (1987). Overall, the "Classroom Research program at COM has helped faculty and administrators come together to better achieve the college's most important goal; to improve the *quality* [italics added] of student learning" (Stetson, 1991, p. 128).

In a follow-up study done at the College of Marin in the spring of 1993, faculty were surveyed regarding their experiences with Classroom Assessment Techniques. Of the 58 faculty who received a survey, 20, or 35% responded. Nancy Stetson (1993) writes "Although the number of faculty represented by the survey results was modest, their comments provide a useful basis for judging the impact of the CATs training program" (p. 3). She reports that 85% of the respondent faculty

> were still using CATs....Eighty-five percent of the faculty believed their use of CATs had a positive impact on their teaching....Two-thirds of the faculty believed their use of CATs had a positive impact on student learning....Fifty percent of the faculty said they had evidence that their use of CATs had a positive impact on teaching or learning, or both. Half mentioned grades; the other half mentioned other indicators such as student performance on final examinations, increased class participation, improved quality of term projects and portfolios and increased rates of progress (p. 3).

Miami-Dade Community College (MDCC) in collaboration with the University of Miami trained a total of 81 faculty and administrators during the fall semesters of 1988 and 1989 in the use of Classroom Research and CATs. "The implementation of a classroom research project constituted one of the requirements of the course" (Cuevos, 1991, p. 382). Interestingly, both faculty and administrators used Classroom Research to investigate the process of instruction more often than student academic and/or learning skills. They found Classroom Research to be a valuable tool for investigating the effectiveness of various instructional processes. In addition, it was found that there was "a positive use of feedback results in the planning of follow-up instructional activities" (p. 381). "55% of the participants stated they had changed their teaching as a result of the feedback/research activities" (p. 387). Thus, the result of faculty and administrators looking at process was an attempt at improving that process - continuous quality improvement. In fact, "The value of classroom research endeavors appears to have outweighed the time it takes to prepare the assessment instruments, to implement the activities and to analyze the results" (p. 381).

Charles Walker was an instructor in an introductory psychology course and he undertook to improve his "achievement of one fundamental goal: increasing the number of my students who master the subject matter of psychology" (1991, p. 68). He deliberately chose to use classroom assessments that were focused on the mastery by the students of the content of his psychology course.

> To assess how well this goal was achieved, (Walker) compared the test performance of students taught *without* CATs against the performance of those taught *with* CATs. Specifically, (Walker) subjected the total test

> scores of student ...taught in 1988-89 and 1989-90 to tests of statistical significance. Because the course content, texts, and examinations were similar across these two academic years, (Walker) felt the comparison could be useful... On average, students taught *with* CATs scored significantly higher on tests - at the .001 level of statistical significance - than students who learned *without* the benefit of CATs. The total test means of these two groups were 86.3 percent and 76.5 percent, respectively. (p. 74).

There was one other difference that may account for some of the advances students made in the two semesters. In the 1989-90 semester, in addition to the use of CATs, "students were given the opportunity to take 'recovery quizzes,' and the points they earned by mere guessing on these quizzes may have artificially inflated their test scores" (p. 75). Even after adjusting for the effect of recovery quizzes, the mean difference was "still statistically significant at the .05 level" (p. 75). Thus it would appear that using CATs with the specific goal of enhancing students mastery of subject matter can impact student performance significantly.

Susan Obler, Voiza Arnold, Carol Sigala, and Linda Umbdenstock (1991) have used CATs and Classroom Research to investigate a new model of teaching in the Rio Hondo Community College. Their research was done with the goal of "developing a new model of classroom instruction" (p. 115). This model incorporated four principles:

- Create a Pro-Diversity Curriculum
- Treat Students as Inexperienced Adult Learners
- Promote Cooperative Learning
- Use Classroom Assessment

(p. 115-116).

In "semester-long pilot projects, the faculty implement(ed) at least one innovative instructional approach and monitor(ed) its effectiveness through Classroom Assessment Techniques" (p. 115). Although this research did not exclusively study the effect that CATs had on the classroom because there was more than one instructional innovation being practiced, students "report that they are able to apply course content more readily and felt more engaged in the courses that use assessment tools" (p. 121). Faculty commented on the effect that the interaction with other faculty in the meeting groups and

the synergy created in the classroom through the use of innovative teaching practices; "our work together has revived my spirit in the classroom, I didn't know that being a student of learning could be so rewarding" (p.122). In addition, the authors noted "a slight increase in retention. The increase is noticeable, though not yet strong enough to be statistically significant" (p. 122).

Kelly (1991, 1992, 1993) investigated the effects of Classroom Research and Classroom Assessment on adult, evening college students at Fullerton College, CA. In 1990 (reported 1991), participants of the study were trained in Classroom Assessment Techniques and asked and supported in their efforts to incorporate these techniques into their classrooms at least five times in the fall semester. The grades and course completion information for the "experimental" classes were collected and compared to the participant faculty's previous spring classes, prior to their training in CATs. Analysis of the data showed that the "course completion rate was significantly higher in the semester in which classroom assessment techniques were used" (Kelly, 1991, abstract). In addition, students were surveyed in the classes where CATs was used and this survey indicated that "classroom assessment increased students' sense of involvement in the class, reduced anxieties about asking question, and effectively met the needs of the adult learners" (Kelly, 1991, abstract).

In the fall of 1991, Fullerton College undertook a project to promote excellence in teaching, and during the fall semester, thirteen faculty "attended workshops on adult learners, learning styles, classroom assessment techniques, and interactive teaching strategies" (Kelly, 1992, abstract). In the spring semester of 1992, the faculty incorporated their new skills into the classroom "while attending monthly meetings to exchange ideas and share experience" (Kelly, 1992, abstract). Students in these classes were surveyed at the beginning, middle and end of the semester to "determine their learning progress and their involvement in learning" (Kelly, 1992, p. 7). Student surveys revealed a high level of interest that was maintained throughout the semester. The final

survey showed "that students were generally very satisfied with the class, and many had exceptionally positive comments about the teacher and the instructional methods. They felt involved in the class, and felt that their needs were addressed by the teacher" (Kelly, 1992, p. 8). Retention data showed no significant increase in student retention. Kelly speculates that "student retention is affected by so many other outside variables that the influence of teaching techniques alone may not produce a clear positive student retention outcome" (1992, p. 9).

Kelly's dissertation (1993) is based on the research conducted in 1991 and 1992. She reports that "Grades and students' self-ratings of learning were positively affected by student involvement levels. Students reported that the class activities which helped them to learn were those which involved them directly, promoted interaction with the teacher (including Classroom Research) and allowed them to apply their knowledge" (Kelly, 1993, abstract). In addition, "Classroom Research clearly had a positive effect on faculty involvement in teaching. Classroom Research provided important information about students which helped in teaching, and it caused faculty revitalization through re-thinking their teaching methods for adult learners" (Kelly, 1993, abstract).

In a quantitative study that was conducted over three semesters in eight community colleges in California, Catlin and Kalina investigated the "effects of classroom assessment on student grades, retention, class completion by gender and ethnicity and on student reports of classroom environment" (1992, p. 11).

> forty-nine pairs of classes...were matched by course topic, instructor, and time of day. The independent variable was instructor use of the Cross/Angelo classroom assessment model. In one of the classes, the instructor taught using the Cross/Angelo model; in the second class of the pair, this treatment was either 1) withheld or 2) data was collected from a matched class prior to the instructor's initiation to the model. Data from instructors who had never been taught the method was also collected to provide an additional control group (1992, p.11).

Classes were also surveyed as to their perception of classroom environment using the College and University Classroom Environment Inventory. This was done due to the strong link in the research literature between classroom environment and student outcomes.

"The results of this study do support the qualitative and anecdotal result" (Catlin & Kalina, 1993, p.57) of previously conducted studies, although the results were not as dramatic. The data showed that the use of Classroom Assessment Techniques:

- had an effect on retention, which ranged in the study from between 1 to 8 percent
- correlates with a "more positive grade distribution, especially in the number of 'A' grades given when Classroom Assessment Techniques are used. Grade point averages have been about the same" (Catlin & Kalina, 1993, p. 57)
- has an effect on course completion by gender in that female students showed a nine percent higher retention in classes where CATs were being used
- affects female students more significantly than males in their opinions of the classroom environment
- affects more positively "new majority" students than white students in their opinions of the classroom environment
- affects all students positively in their opinion of classroom environment as compared to classes where CATs were not used.

Leonard Malinowski has reported on an initiative at Finger Lakes Community College in New York state wherein faculty members participated in the use of Classroom Assessment Techniques. One of the goals of the initiative was "to obtain observations and measures... that permit inferences or generalizations about the impact of CATs on the educational experience at FLCC. These should permit a connection between CATs and

institutional effectiveness" (1994, p.6). This is an attempt to connect the use of CATs to quality. One of the results of the study which was seen as an indication of the success of the project was the request and willingness of the participants to continue using CATs after its initial implementation, because they saw the "merit of CATs as a device to accomplish...improvement" (p.11). "Further evidence of the success of the project was the animated, interactive discussions by participants in monthly meetings....(and) the most significant evidence was in the form of teachers using the CATs data to improve their instruction" (p. 12).

Mimi Steadman's doctoral dissertation investigated "how Classroom Assessment has been implemented in practice by community college teachers.... the satisfaction of community college students in courses taught by teachers who incorporate Classroom Assessment activities.... (and) the potential of Classroom Assessment Techniques to promote metacognition and the use of learning strategies" (1994, p. 11). She found "that teachers' purposes for using Classroom Assessment influenced how they implemented CATs, what subsequent changes they made in their teaching, and how they perceived the impact of this innovation" (p. 200). Teachers also experienced some unexpected benefits from their use of CATs, "such as a new ability to tune into students' voices, or the chance to be part of a teaching community, that were not part of their original objectives for implementing this innovation" (p. 202).

Student responses were positive and "with surprise in some cases, to the opportunity to voice their opinions and to help control the organization of the classroom" (p. 218). Thus it would seem that Steadman found that CATs positively affected students' perception of classroom environment. "Over half the students indicated that they were 'more' or 'much more' satisfied with classes that incorporated CATs than they were with other classes they had taken at the college" (p. 219).

While investigating the potential of Classroom Assessment Techniques to promote metacognition and the use of learning strategies, Steadman found that

> faculty reported that they believed that participating in CATS, and getting feedback from CAT results, makes students aware of their learning behaviors and helps them monitor their progress. Some faculty reported using Classroom Assessment in an effort to help students improve their learning skills, by requiring them to monitor, rehearse, organize, synthesize and reflect on new material. Interviews with students, however, revealed that they were not aware that in addition to teaching course content, faculty were trying to help them learn how to learn (p 222).

It would seem that faculty did not overtly demonstrate for students how "learning behaviors could be transferred to other learning and study situations" (p. 223). "The findings from this study, along with existing research on learning skills transfer (Sternberg, 1983), suggest that teachers must be very explicit in their efforts to use Classroom Assessment to introduce students to learning strategies" (p. 224).

Existing research has investigated the effects of CATs on various aspects of both faculty and students in their involvement in the teaching and learning process. CATs is valuable because of its potential benefits to both faculty in their attempts to improve their effectiveness and to students in their growth in learning strategies.

Concluding Remarks

This chapter presented an overview of the growth of Total Quality Management, its application to the higher education environment and the teaching and learning process. The literature around the use of Classroom Assessment as a Continuous Quality Improvement tool was summarized. This literature was used to develop the research question on faculty perception of the appropriateness of the implementation of Classroom Assessment as a quality improvement method. It is also used as the theoretical framework for analyzing the research findings around the issue of quality in the classroom. The chapter then reviewed the literature exploring classroom environment

and its effect on the teaching and learning process and the use of classroom environment as a measure of quality in the classroom. This literature guides the examination of classroom environment. Finally, this chapter explored the specific research that has been done with respect to Classroom Assessment Techniques. The exploration focused on the potential of CATs to enhance the quality of the teaching and learning process.

CHAPTER III - METHODOLOGY

Introduction

This study employed a posttest-only control-group design (Borg & Gall, 1989). Faculty were trained in the use of Classroom Assessment Techniques. After treatment, observations were made of the faculty and their classes using a modified College and University Environment Inventory which collected information about classroom environment, as well as information about faculty and student attitudes towards CATs. In addition, a survey was completed by faculty exploring their perceptions of the effectiveness and appropriateness of CATs as a Continuous Quality Improvement (CQI) data collection tool. This chapter outlines the process of gaining permission to do the study in the cooperating institution, describes the instruments and techniques used in the study and the methodology for choosing the sample participants and control participants. The piloting process is described as well as the training (treatment) that participant faculty received. The chapter ends by addressing ethical concerns and considerations.

Gaining Access to the Institution

The institution in which this study took place was a postsecondary technical institute in Alberta. The institution had recently embarked on a Continuous Quality Improvement journey. The institution had identified the implementation of the CQI process into the instructional process as one of the major thrusts of their implementation strategy. Knowing this, the researcher approached the manager of the Staff Training

department to explore the feasibility of training faculty in Classroom Assessment Techniques. The response was positive and supportive. The researcher then approached the Director of Research and Academic Development of the cooperating institution to explore the feasibility of a study. Again the response was positive and supportive. Upon submission of a formal proposal to the Director of Research and Academic Development, and subsequent routing of the document to the Vice-President Academic, formal permission was granted to embark on the study. In consultation with the researcher, the cooperating institution selected and hired a trainer to train faculty in CATs. (See Appendix D for formal permission.)

Instruments and Techniques

The research questions of this study were addressed through the use of a Faculty Participant Questionnaire and the application of a modified College and University Classroom Environment Inventory (CUCEI). Four forms of the modified CUCEI were created: Student Participant, Faculty Participant, Student Control and Faculty Control. Data gathered through the application of the inventory was made available as simple feedback to individual instructors for their classes. For the purpose of the thesis, all data were analyzed anonymously; neither individual instructors nor their students were identified during the analysis.

The research question "What are faculty and student perceptions of the classroom environment as measured by the College and University Classroom Environment Inventory (CUCEI) in a classroom where Classroom Assessment Techniques are being used?" was measured using a modified CUCEI. The methodology consisted of the following steps:

1. Training of faculty in the appropriate use of the Classroom Assessment Techniques occurred in May of 1995.

2. Volunteer faculty for participation in the study were solicited.

3. Upon commencement of classes in September, sample faculty chose a class in which they introduced and applied CATs. Their application of CATs was supported through the use of group meetings and consultations organized and facilitated by the researcher.

4. Volunteers to participate in the study as control were solicited by the researcher in October. Four volunteer faculty were selected by the researcher as representative of the four divisions of the institution. Control faculty conducted their classes as they normally would, without the application of CATs.

5. In late October, the four forms of the modified CUCEI (Participant Faculty, Participant Student, Control Faculty and Control Student) were piloted with student and faculty groups.

6. The appropriate forms of the modified CUCEI was administered by the researcher to check both sample and control faculty, and sample and control student perceptions of classroom environment in November.

7. Demographic information was gathered with the modified CUCEI on sample and control faculty, for the purpose of investigating whether the sample was representative of the faculty of the cooperating institution, thus allowing for generalizability of the results. Demographic information was gathered with the modified CUCEI on sample and control students, for the purpose of investigating whether the student sample was representative of the cooperating institution's student body, thus allowing for generalizability of the results.

The research question "What are student perceptions of the appropriateness of CATs as a method of improving the quality of the teaching and learning process?" was addressed by the Participant Student form of the modified CUCEI. Items 50 - 56

explored student perceptions of the appropriateness of CATs as tools to improve student learning. (See Appendix B for a copy of the instrument).

The research question "What are faculty perceptions of the appropriateness of CATs as a method of improving the quality of the teaching and learning process?" was addressed by the Participant Faculty form of the modified CUCEI. (See Appendix B for a copy of the instrument). Items 50 - 60 explored faculty perceptions of the appropriateness of CATs as tools to improve teaching and learning. More specific data describing faculty perceptions of CATs were gathered through the application of a questionnaire designed by the researcher. (See Appendix C for a copy of the Faculty Participant Questionnaire.) The questionnaire was piloted in late October with a group of faculty who had been trained in Classroom Assessment Techniques, but were not involved in the study.

The CUCEI Instrument

The College and University Classroom Environment Inventory (CUCEI) instrument was chosen for this study because it has been used with success in the past by Catlin and Kalina in their 1993 study of the application of CATs to colleges in California. The instrument

> is a 49 question survey which asks students their opinions of the class environment. The instrument was found to be valid and reliable when used in technical schools in Australia and at universities in the United States. (Catlin & Kalina, 1992, p. 28)

Four forms of the CUCEI were created. The Student Control and the Faculty Control forms only had questions gathering demographic data added to the original 49 items. The researcher added 7 items to the Student Participant form that explored student perceptions of Classroom Assessment (See Appendix J). The Faculty Participant form of the modified CUCEI had 11 items added by the researcher to explore faculty participants'

perceptions of the effect of the application of CATs (See Appendix J). Demographic data also was gathered on the Faculty and Student Participant groups to aid in the judgment of the generalizability of the data to the population (See Appendix J).

In the period that this instrument was administered, students were given a verbal overview of the research study, assurances of their privacy and anonymity and an opportunity to opt out of the study. Students who volunteered to participate were then asked to sign a consent form. This procedure and the completion of the instrument required approximately 30 minutes. (See Appendix B for copies of the four forms of the modified CUCEI instrument.)

Data Entry

Data gathered through the application of the modified CUCEI were entered into electronic form by a professional data entry firm. All data were entered from its original response form as it was seen - that is, if there was an A in the box, an A was entered. All data were entered twice by two different clerks and then the files verified to ensure accuracy. Blank response boxes or those that contained more than one letter were considered to be invalid responses. One control student response form was eliminated from the study due to 80% invalid responses on the form. The student had entered many letters other than A to D on the form which indicated a lack of understanding of the instructions, the statements and the purpose of the questionnaire. The data were entered into a flat ASCII file.

Data Preparation

Because the data were entered alphabetically, they needed to be transformed into numeric data to facilitate analysis. Items on the modified CUCEI were either positively or negatively worded. An example of a positively worded item is "The students look

forward to coming to class." The positively worded item responses were transformed such that A=5 (Strongly Agree), B=4 (Agree), C=2 (Disagree) and D=1 (Strongly Disagree). All invalid responses were given a value of 3. This was done because all of the responses that had more than one letter in the response box for an item were a B/C response, indicating a neutral response to the item. To determine why students might leave a response blank, a class that had completed the inventory was consulted. They indicated that if they left an item blank, it was because they had no feeling about that item. Negatively worded items had the order of transformation to numeric values reversed {A=0 (Strongly Agree), B=1 (Agree), C=4 (Disagree) and D=5 (Strongly Disagree)} with invalid responses scoring a value of 3. An example of a negatively worded item is "Students are dissatisfied with what is done in the class." The negatively worded items were numbers 2, 3, 6, 7, 11, 13, 16, 19, 24, 25, 26, 29, 30, 31, 32, 35, 36, 40, 42, 43, 44, 45, 48, 49, 50 and 53.

The Sample

The sample for this study consisted of ten instructors from the cooperating institution. For each of the instructors, the students of one class were sampled, with the exception of one instructor for whom three classes were sampled. This instructor had three sections of the same course and was applying CATs in all three of the classes for consistency. This situation allowed a unique opportunity to include more students in the sample. In addition, four instructors and an appropriate class of each of the instructors was chosen to be the control.

The sample instructors were self-selected from the pool of faculty trained in Classroom Assessment Techniques. The Faculty Participant group was reduced from the self-selected group of 17. Faculty were eliminated from the study, by the researcher, if they did not teach in a lecture style class (as opposed to a laboratory class), or had classes of a duration other than 16 or 17 weeks. There was also some attrition due to health and

time factors. Instructors designated the sample class from their teaching assignment. That is, they chose the class in which they would apply the CATs.

The control instructors were selected by the researcher from faculty who volunteered to be involved in the study as members of a control group and had not had experience or training in CATs. Care was taken to select one faculty member from each of the four divisions of the institute.

The incentives for faculty to participate in the study included receiving training in Classroom Assessment Techniques, a copy of Classroom Assessment Techniques: A Handbook for College Teachers by Angelo and Cross (1993), and support from the researcher, participating faculty and the staff training department of the cooperating institution. All members of the Faculty Participant and Faculty Control groups received a copy of the results of the study, as well as information about their classes, as gathered through the application of the modified College and University Classroom Environment Inventory.

Training of Participants

Through cooperation with the staff training group at the cooperating institution, an appropriate expert trainer was chosen to train all faculty who wished to be trained in CATs. The training was customized to suit the participants' needs, knowledge and experience. An outline of the training session follows.

Workshop Goals:

- To develop an understanding of Classroom Assessment Techniques
- To develop learning goals that fit your students and your curriculum
- To plan a Classroom Assessment project for one class

Agenda, Day One:

- Introductions and Goals
- Classroom Assessment: Overview

- Classroom Assessment Project Scenarios
- Ideal Student Assessment Responses
- Benefits and Barriers to Classroom Assessment
- Break
- Scenarios for Responding to Student Feedback
- The Student's Problem is Our Problem
- Designing Student Learning Goals
- Wrap-up, Assignment for Day 2

Agenda, Day Two:

- Goals for the Day; Assignment Review
- Planning a CATs Project for One Class
- Cautions and Clarifications
- Organizational Snags and Supports
- Break
- More Planning: It's All in the Details
- How Does Culture Affect Learning?
- Going Public: How Will You Share Your Results?
- Loose Ends and Summary

Obler, S. (1995, May 29).

Piloting the Instruments

In October, prior to gathering data, the instruments and the response forms were piloted. The student pilot group consisted of five students who had exposure to Classroom Assessment Techniques and volunteered to be in the pilot group. Two of the students completed the Student Control form of the modified College and University Classroom Environment Inventory (CUCEI) and response form and three completed the Student Participant form of the modified CUCEI and response form. Due to their critique, minor wording and formatting changes were made to the forms.

Firstly, the original CUCEI used SA, A, D and SD as the responses respectively representing Strongly Agree, Agree, Disagree and Strongly Disagree. The modified

CUCEI used in this study used A, B, C, and D to represent these responses respectively. Secondly, the changes in wording of specific items of the original 49 items of the CUCEI were done to facilitate understanding of the meaning of the item. The changes are illustrated in the following table.

Table 2 - Changes Made to the Original Items of the CUCEI

Item	Original Wording	Modified Wording
4	The students look forward to coming to classes.	The students look forward to coming to class.
16	Students "clockwatch" in this class.	Students constantly watch the clock in this class in anticipation of its end.
22	The instructor helps each student who is having trouble with the work.	The instructor makes sure each student who is having trouble with the work receives help.
27	Teaching approaches in this class are characterized by innovation and variety.	Teaching approaches in this class are generally innovative and have variety.

The participant faculty CUCEI and questionnaire were piloted by a group of four instructors who were trained in the use of CATs, but were not involved in the study. No changes were made due to this group's input.

Ethical Concerns and Considerations

Faculty were invited for training in Classroom Assessment Techniques by the processes normally used by the cooperating institution. That is, faculty sought out the training in response to advertising by the cooperating institution. The training was two

days long and occurred during the normal inservice period. Mid-morning of the second day, an information document for research participants (See Appendix A) was distributed to the trainees describing the study, including a description of the time commitment, the information that would be gathered, and how that information would be used. Faculty were assured in the information document, as well as verbally, that they would be able to opt out of the study at any time and that all data gathered would not be released by the researcher to any third party. Participants were asked to read the information document and to consider being involved in the study. Faculty were then asked to indicate their interest in being involved in the study by completing a simple instrument (see Appendix A). Thus the consent of faculty to participate was based on information about the study and a familiarity with the techniques (CATs) that they were asked to administer. Faculty were asked to sign a consent form prior to their inclusion in the study (See Appendix A).

In the week prior to the administration of the CUCEI, students in the treatment class from which data was gathered, were informed, through the reading of an open letter (See Appendix A) to students, of the type of data that would be gathered and for what purpose.

At the time that the CUCEI was administered, the researcher began by introducing herself to the class and thanking the classroom teacher for making the time available for the students to complete the survey. The classroom teacher was then excused from the classroom and students were given an explanation about the study (See the Introductory Script in Appendix A). Those who wished to opt out of the study were given the opportunity to leave. This was done so that a student's non-participation in the study would not be known by the classroom instructor, and consequently, students that chose to opt out were assured that their decision would not affect their grade. There were very few students who chose to opt out of the study; that is, student attrition was negligible. Consent forms were distributed and students were asked to sign them and return the form to the researcher as an indication of their willingness to participate in the study. A copy

of the consent form is included in Appendix A. The modified CUCEI was completed anonymously by students and random identification numbers were applied to the surveys after completion for the researcher's use only. Thus, individual students could not be identified. Student surveys were coded to their instructor so that instructors could receive information about their class's perception of the classroom environment. All completed student and faculty Modified CUCEIs and Faculty Participant Questionnaires were destroyed on the day after the successful defense of the thesis. During the course of the study, all raw data were stored in a locked room in the researcher's home.

Conclusion

This chapter outlined the process of receiving permission to perform the research in the cooperating institution, described the method of choosing the sample participants and control participants, described the training (treatment) that they received and addressed ethical concerns and considerations. In the next chapter, the data collected through the application of the surveys will be analyzed and reported.

CHAPTER IV - PRESENTATION OF RESULTS

Introduction

This chapter presents the research findings gathered using the modified College and University Classroom Environment Inventory and the open-ended Faculty Participant Questionnaire.

The chapter is organized in two major sections. The first section deals with demographic information and results around classroom environment gathered using the modified College and University Classroom Environment Inventory (CUCEI). The second section deals with the perceptions of faculty about the application of Classroom Assessment Techniques (CATs) and faculty and student perceptions of the appropriateness of CATs as a quality improvement tool. This information was gathered with the long answer Faculty Participant Questionnaire and a section of the modified CUCEI. For clarity, data are organized into tables. Bolded items in the tables are of special interest and are discussed in more detail in the text of the thesis. An alpha level of 0.05 was used for all statistical tests. Some of the minor findings are commented on in this chapter with no further discussion. Findings that are of more interest are discussed more thoroughly in Chapter V.

The first section begins with a description of the faculty sample, followed by a demographic description of the Faculty Control group and the demographics of the entire faculty population of the cooperating institution. This portion concludes with comments on the congruence of the groups used in the study to the population of the institution.

Demographic information of the student population of the study follows and a comparison is made to the demographic information about the entire student population supplied by the cooperating institution. The findings regarding classroom environment are then presented including some serendipitous findings regarding CATs, Classroom Environment, Gender and the Office Administration Program.

The second section of the chapter reports faculties' experience with the application of CATs to their classes and both faculty and student perceptions of the use of CATs as a quality improvement tool. This section reports the findings gathered from faculty with the open-ended Faculty Participant Questionnaire and the portion of the CUCEI that dealt with CATs. This section reports the CATs used by the faculty, the most frequently used and helpful CATs, difficulties encountered in the use of CATs, and the difficulties faculty encountered in their application of CATs. The benefits and drawbacks of CATs as perceived by faculty are reported. The last portion of this section deals with CATs and the quality of the teaching and learning experience, CATs as a tool for improving quality, and faculty and student perceptions of CATs as a CQI tool. The chapter ends with a conclusion.

Faculty Demographics

Demographic Characteristics of the Faculty Participant Group

Ten faculty were involved in the study as the participant group. There were five males and five female instructors, with teaching experience ranging from less than one year to more than ten years of experience. Two instructors were from each of the Engineering Technologies Division and Health Sciences Division, five from the Business Division and one from the Industrial Division. All instructors were from different programs with the exception of three instructors from the Office Administration Program.

The Office Administration Program is unique in that it resides at a satellite campus and has an exclusively female faculty and student body. Participant Faculty demographic data is displayed in Table 3.

Table 3 - Demographic Characteristics of Faculty Participant Group

Participant Faculty	Gender	Age	Education	Experience (Years)	Division
1	Male	45-55	Bachelor's	10+	Engineering
2	Male	35-45	Bachelor's	10+	Business
3	Female	35-45	Diploma	4-6	Business
4	Female	35-45	Bachelor's	4-6	Business
5	Female	35-45	Bachelor's	7-10	Business
6	Male	25-35	Diploma	4-6	Health Sciences
7	Male	25-35	Bachelor's	4-6	Industrial
8	Female	45-55	Bachelor's	7-10	Business
9	Female	25-35	Diploma	0-3	Health Sciences
10	Male	45-55	Bachelor's	10+	Engineering

Alternatively, the demographic information can be arranged according to the characteristics of the group to aid in determining the representability of the Faculty Participant group of the larger population (See Table 3a).

Table 3a - Demographic Characteristics of Faculty Participant Group (n=10)

Gender	**Male**	**Female**		
n=10	5	5		
Percent	50%	50%		
Age	**25-34 Years**	**35-44 Years**	**45-54 Years**	**55+ Years**
n=10	3	4	3	0
Percent	30%	40%	30%	0%
Education	**Journeyman**	**Diploma**	**Bachelor's**	**Post Grad Degree**
n=10	0	3	7	0
Percent	0%	30%	70%	0%
Experience	**0-3 Years**	**4-6 Years**	**7-10 Years**	**10+ Years**
n=10	1	4	2	3
Percent	10%	40%	20%	30%
Division	**Industrial**	**Health Sciences**	**Engineering**	**Business**
n=10	1	2	2	5
Percent	10%	20%	20%	50%

Demographic Characteristics of the Faculty Control Group

The Faculty Control group consisted of one instructor from each of the four divisions. These faculty were volunteers and were accepted into the study because their

classes were of the same duration (16 or 17 weeks) as the Faculty Participant group's classes. The demographic characteristics of the Faculty Control group are summarized in Table 4.

Table 4 - Demographic Characteristics of Faculty Control Group

Control Faculty	Gender	Age (Years)	Education	Experience (Years)	Division
1	Female	35-45	Post Grad Deg	4-6	Health Sci.
2	Female	35-45	Bachelor's	4-6	Business
3	Male	45-55	Bachelor's	7-10	Industrial
4	Female	35-45	Bachelor's	7-10	Engineering

Demographic Characteristics of the Cooperating Institution's Faculty

In consideration of the generalizability of results of the study, demographic information was solicited from the Employee Relations department of the cooperating institution for all the salaried academic staff for the 1995-96 academic year (Table 5).

Table 5 - Demographic Characteristics of Cooperating Institution's Faculty - 1995 - 1996 Academic Year

Gender	**Male**	**Female**			
n=726	589	137			
Percent	81%	19%			
Age	**25-34**	**35-44**	**45-54**	**55+**	
n=726	34	237	322	133	
Percent	4.7%	32.6%	44.3%	18.3%	
Education	**Journeyman**	**Diploma**	**Bachelor's**	**Post Grad**	**Other**
n=726	132	154	286	140	14
Percent	18.2%	21.2%	39.4%	19.3%	1.9%
Experience	**0-3 Years**	**4-6 Years**	**7-10 Years**	**10+ Years**	
n=726	94	115	89	428	
Percent	12.9%	15.8%	12.3%	58.9%	
Division	**Industrial**	**Health Sciences**	**Engineering**	**Business**	**Other**
n=726	219	85	225	156	41
Percent	30.2%	11.7%	31.0%	21.5%	5.6%

Source: D. Willott, personal communication, December 11, 1995, January 2, 1996.

It is very difficult with such a small sample for both the participant and control groups to make any strong claims for representability of the sample to the population of the institution. Certainly, the study contained a much higher percentage of females than

the larger population would predict. This higher representation of females could be due to a number of reasons. Firstly, the Office Administration Program had three instructors involved in this study, all of whom were female because the Office Administration Program is exclusively female. It is logical that a relatively large number of instructors from this program would volunteer to be trained in CATs and be involved in the study as the Office Administration Program is one of the most advanced programs in terms of their involvement in Continuous Quality Improvement (CQI) principles. Since CATs was advertised in the training brochure as a method of improving the teaching and learning experience, it is logical that these instructors would be open to such an innovation. In addition, one of the three instructors was familiar with CATs before the training and inception of this study and encouraged her colleagues to attend and become involved. One of the five characteristics Rogers (1983) outlines as important to the adoption of innovations is observability - whether a potential adopter has seen others using this innovation.

The Office Administration Program faculty are a relatively cohesive unit that are attempting to use the team/cooperative structure both in their management of the program and in their classes. Thus, two other characteristics that Rogers (1983) describes as important to the adoption of innovations would be applicable: (a) perceived relative advantage of the use of the innovation to the context and, (b) compatibility with existing values.

Secondly, the relatively high representation of females in this study could be due to a general predisposition of females to be open to innovations and change. Wangen (1982) conducted a study "of the relationships between organizational and personal characteristics and responses to innovation (in schools)" (p. 1). "Although differences were not significant, females were slightly more receptive to change, were somewhat more group-identified, and felt a lower sense of power. Multiple regression analysis

revealed a strong female pattern predictive of receptivity (to change and innovation)" (p. 8).

Thirdly, the Office Administration Participant Faculty felt that females tend to value interpersonal relationships and communication skills in their teaching styles and so are attracted to an innovation that lends itself to having a positive impact on these skills.

The mean age of the faculty involved in the study (40 years) was slightly lower than the mean age of the general population of the institute (48 years). Similarly, the years of teaching experience (70% in the 4-10 year range) is less than the general population of the institute (59% in the 10+ years range). This too is logical as the older population would again be less open to innovations as they begin to look forward to retirement. Also, the older, more experienced population would be relatively secure in their employment and may not feel pressured to work towards improving the teaching and learning environment in the same way that untenured staff might. Thus, they would be less likely to become involved in innovative methods of teaching out of fear of losing their employment. More experienced staff have been retained over the years and so have reason to believe that their present method of presenting instruction is of acceptable quality. They are satisfied with their performance and do not necessarily seek ways of improving it.

The highest educational level achieved by the faculty involved in the study is congruent with the education levels of the faculty throughout the institute. Over 61% of the population of the cooperating institution have either diplomas or baccalaureate degrees. The participants of the study had 93% fall in this range (10 participant faculty and 3 control faculty).

Considering the demographic information as a whole, with the exception of gender, the participant and control faculty groups appear to be reasonably representative of the faculty of the cooperating institution.

Student Demographics

Demographic Characteristics of the Student Participant Group

The Student Participant group consisted of twelve classes representing all four divisions of the institute. Seven of the classes were from the Business Division with five of them from one program - the Office Administration Program. There were two classes each from the Health Sciences Division and the Engineering Technologies Division and one class from the Industrial Division. Demographic characteristics of the Student Participant group are summarized in Table 6.

Table 6 - Demographics of Student Participant Group

Gender	**Male**	**Female**		
n=228	78	150		
Percent	34.2%	65.8%		
Age	**17-21**	**22-26**	**27-31**	**32+**
n=228	132	66	11	19
Percent	57.9%	28.9%	4.8%	8.3%
Education	**High School**	**1 Yr. Post Sec.**	**2 Yr. Post Sec.**	**Journeyman**
n=228	100	65	52	11
Percent	43.9%	28.5%	22.8%	4.8%

Demographic Characteristics of the Student Control Group

The Student Control group consisted of four classes, one from each division of the cooperating institution. The class sampled from the Engineering Technologies Division

was smaller than usual due to a high number of students from that class declining to participate in the completion of the CUCEI. The demographic characteristics of the Student Control group are summarized in Table 7.

Table 7 - Demographic Characteristics of the Student Control Group

Gender	**Male**	**Female**		
n=82	36	46		
Percent	43.9%	56.1%		
Age	**17-21 Years**	**22-26 Years**	**27-31 Years**	**32+ Years**
n=82	54	19	5	4
Percent	65.8%	23.2%	6.1%	4.9%
Previous Education	**High School**	**One Year Post Sec.**	**Two Years Post Sec.**	**Journeyman**
n-82	53	18	9	2
Percent	64.6%	22.0%	11.0%	2.4%

Demographic Characteristics of the Cooperating Institution's Student Body

Demographics for the student body of the cooperating institution were supplied to the researcher by the Research and Academic Development unit of the institution. The most recent demographics for students available were for the 1994-5 academic year (Table 8). Since the demographics change only in very minor ways from year to year, it was decided that this information could be used as a reference. Only those students

registered in full-time programs were included in these demographics as the Participant and Control Student groups were only in full-tine programs.

Table 8 - Demographic Characteristics of the Cooperating Institution's Student Body - 1994 - 1995 Academic Year

Gender	**Male**	**Female**		
n=6460	4091	2369		
Percent	63.3%	36.7%		
Age	**17-21 Years**	**22-26 Years**	**27-31 Years**	**32+ Years**
n=6240	3626	1397	455	762
Percent	58.1%	22.4%	7.3%	12.2%
Education	**High School**	**Some Post Sec.**		
	62%	38%		

Source: Jeff Donnelly, Research and Academic Development, personal communication, December 21, 1995.

The demographics for both the Student Control and Student Participant groups are congruent with the demographics for the student body of the cooperating institution when we look at the age of the students. The mean ages were 22.7 years, 21.8 years and 22.9 years respectively for the Student Participant, Student Control and student body groups. Interestingly, although the members of the Student Participant group in this study were as young as the general population of the institution, they appear to have a higher level of education prior to attending the institution with 56.1% having some post secondary education as compared to 38% for the general population. This could be due to the second year classes involved in the study counting their first year as "Previous

Education." The control group however, is congruent with the general population with 35.4% having previous post secondary education.

Due to the high number of classes from the Office Administration Program which has an exclusively female student body, there is an over-representation of females in the participant and control groups - 65.8% and 56.1% respectively. This is high when compared to 36.7% in the general population. The control group has a higher than expected number of females because the class from the Health Sciences Division was almost exclusively female (only one male student out of a class of 25) and the class from the Engineering Technologies Division which is normally highly represented by males was poorly attended (13 out of a potential 40).

Classroom Environment

The Scales and Variables of the CUCEI

Results regarding classroom environment were gathered using the modified College and University Classroom Environment Inventory (Treagust & Fraser, 1986). The original inventory contains seven scales that describes the psychosocial characteristics of the learning environment. For the purpose of this study, the sum of these seven scales describes the Classroom Environment Variable. Thus, the seven classroom environment scales examine components of the Classroom Environment Variable.

The Personalization (PERS) scale focuses on the relationship dimension of student interaction with the instructor. The "emphasis is on opportunities for individual students to interact with the instructor and on concern (of the instructor) for students' personal welfare" (Treagust & Fraser, 1986, p. 8). Students feel more comfortable in a

learning environment if they feel that they have a personal relationship with the instructor.

The Involvement (INV) scale explores the students' relationship with the learning activities that occur in the learning environment. It measures the "extent to which students participate actively and attentively in class discussion and activities" (Treagust & Fraser, 1986, p. 8). Students are most satisfied with their learning environment if they are actively involved.

The Student Cohesiveness (STCO) scale focuses on the relationship dimension of students' interactions with each other. This scale measures the "extent to which students know, help and are friendly toward each other" (Treagust & Fraser, 1986, p. 8). In a classroom that has a high rating of Student Cohesiveness, students will feel comfortable interacting in groups that vary in their membership as they feel that they are accepted and liked by their peers.

The Satisfaction (SAT) scale measures a students' overall enjoyment of the class. A high score on the Satisfaction Scale would indicate that a student enjoys the class and looks forward to attending.

The Task Orientation (TSKO) scale focuses on the personal development of the students of the class. This scale measures the degree to which students are clear on what needs to be accomplished and that the task is appropriate for the learning goals of the class. Treagust and Fraser (1986) describe this scale as the "extent to which class activities are clear and well organized" (p. 8).

The Innovation (INN) scale examines the system change dimension of the class. That is, it measures "the extent to which the instructor plans new, unusual class activities, teaching techniques, and assignments" (Treagust & Fraser, 1986, p. 8). Students like a variety of activities to be offered in a class.

The Individualization (IND) scale also focuses on the system change dimension of the class. This change is focused on adaptation of the system to individual needs, interests, and strengths. This scale measures the "extent to which students are allowed to make decisions and are treated differentially according to ability, interest, and rate of working" (Treagust & Fraser, 1986, p. 8). Students want to be treated as unique individuals.

Descriptions of the seven original scales of the College and Classroom Environment Inventory are presented in Table 9.

Table 9 - Descriptive Information for Each Scale in Original CUCEI

Scale Name	Scale Description	Sample Item
Personalization (PERS)	Emphasis on opportunities for individual students to interact with the instructor and on concern for students' personal welfare.	The instructor goes out of his/her way to help students.
Involvement (INV)	Extent to which students participate actively and attentively in class discussions and activities.	The instructor dominates class discussion.
Student cohesiveness (STCO)	Extent to which students know, help and are friendly toward each other.	Students in this class get to know each other well.
Satisfaction (SAT)	Extent of enjoyment of classes.	Classes are boring.
Task orientation (TSKO)	Extent to which class activities are clear and well organized.	Students know exactly what has to be done in our classes.
Innovation (INN)	Extent to which the instructor plans new, unusual class activities, teaching techniques, and assignments.	New and different ways of teaching are seldom used in this class.
Individualization (IND)	Extent to which students are allowed to make decisions and are treated differentially according to ability, interest, or rate of working.	Students are allowed to choose activities and how they will work.

Treagust & Fraser, 1986, p. 8.

In addition to these seven scales, an eighth scale was added by the researcher to look at Student and Faculty Participants' perceptions of the application of Classroom Assessment Techniques (CATs) to the teaching and learning situation. An example of a CATs item on a student inventory is "All instructors should use classroom assessments." A faculty inventory example is "CATs is an easy tool to use."

Descriptive Statistics

Student Participant and Faculty Participant forms of the CUCEI contained the 7 original classroom environment scales and the eighth scale added by the researcher to investigate student perceptions of Classroom Assessment. The descriptive statistics of the responses of these groups are summarized in Tables 10 and 11 respectively. Since each scale contains seven items, and the responses to each scale were valued ranging from 1 to 5, the lowest score a scale could receive is 7 and the highest 35.

Table 10 - Descriptive Statistics of the CUCEI - Student Participant Group (n=230)

Scale	Mean	Minimum	Maximum	Standard Deviation
Personalization	28.53	12	35	4.76
Involvement	25.75	13	34	4.09
Student Cohesiveness	29.57	14	35	4.59
Satisfaction	25.94	7	35	6.18
Task Orientation	27.17	10	35	5.07
Innovation	22.78	10	35	5.31
Individualization	19.98	9	34	4.65
Classroom Assessment	27.65	9	35	5.15

Table 11 - Descriptive Statistics of the CUCEI - Faculty Participant Group (n=9*)

Scale	Mean	Minimum	Maximum	Standard Deviation
Personalization	31.56	27	35	3.00
Involvement	25.11	22	29	2.42
Student Cohesiveness	28.78	20	35	5.54
Satisfaction	28.22	20	32	3.46
Task Orientation	28.00	24	31	2.60
Innovation	20.56	14	27	5.08
Individualization	18.33	13	27	5.07
Classroom Assessment	45.44** (28.92)***	37** (11.3)***	53** (33.7)***	5.03** (3.20)***

* n=9 for this table because one Participant Faculty member did not complete the first 49 items of the modified CUCEI which comprise these scales.

** The Classroom Assessment scale on the Participant Faculty form consisted of 11 items. Thus the minimum possible score is 11 and the maximum possible score is 55.

*** These are the proportionate values for the Classroom Assessment scale based on a total possible of 35. These are the values that were used for all subsequent statistical analysis.

When we exame Tables 10 and 11 we note that the student minimum scores are substantially lower than the faculty minimum scores. This would indicate that in the Student Participant group, there was at least one student that was somewhat disatisfied with that particular aspect of classroom environment, and thus scored the scale low. The high student maximum of 34 or 35 would indicate that there is at least one student that was very satisfied with that environment scale and scored it highly. Faculty were more moderate in their perceptions, shown by the moderate scores in both the minimum and maximum columns. The inflated value for the Classroom Assessment scale in the Faculty Participant group (Table 11) is due to that scale having 11 items rather than the normal 7. The value in brackets is the proportionate score out of a possible 35 that was used in all the statistical analysis.

The following two tables describe the Student and Faculty Control groups' results of the CUCEI (Table 12 and 13 respectively). Note that only seven scales are reported as the scale describing respondents attitudes towards Classroom Assessment Techniques (CATs) was not included in the Faculty and Student Control forms of the CUCEI as these groups had no experience with CATs.

Table 12 - Descriptive Statistics of the CUCEI - Student Control Group (n=82)

Scale	Mean	Maximum	Minimum	Standard Deviation
Personalization	28.66	14	35	5.06
Involvement	24.63	9	34	5.45
Student Cohesiveness	28.00	11	35	5.68
Satisfaction	26.56	7	35	6.68
Task Orientation	27.68	16	35	4.50
Innovation	22.22	9	34	6.00
Individualization	19.35	7	30	5.29

Table 13 - Descriptive Statistics of the CUCEI - Faculty Control Group (n=4)

Scale	Mean	Maximum	Minimum	Standard Deviation
Personalization	28.75	25	33	3.50
Involvement	21.00	15	26	4.55
Student Cohesiveness	25.50	23	28	2.38
Satisfaction	28.00	27	30	1.41
Task Orientation	30.75	21	35	6.65
Innovation	15.50	8	24	7.33
Individualization	16.00	11	21	4.16

To facilitate analysis of a general variable of Classroom Environment, the seven scales that refer to the components of classroom environment measured by the CUCEI were summed to create a Classroom Environment Variable. The minimum and maximum that could appear for the Classroom Environment Variable are 49 and 245, respectively. The Classroom Environment Variable for each of the four groups are summarized in Table 14.

Table 14 - Descriptive Statistics of the Classroom Environment Variable for All Groups

Group	Mean	Maximum	Minimum	Standard Deviation
Student Participant	179.72	114.00	233.00	23.95
Student Control	177.11	98.00	222.00	30.07
Faculty Participant	180.56	158.00	206.00	13.53
Faculty Control	165.50	148.00	188.00	8.45

Correlational Statistics

Pearson Product Moment correlations were performed on the data, grouping the sample to reveal interesting correlations. First, all participants (students and faculty) were grouped together and correlations run on all the CUCEI scales including the Classroom Assessment Techniques (CATs) scale (Table 15). Secondly, correlations were run on the classroom environment scales contained in the CUCEI without the CATs scale on the entire control group (faculty and students) (Table 16). Thirdly, the sum of the seven classroom environment scales, the Classroom Environment Variable was correlated with the CATs scale (Table 17).

Table 15 - Intercorrelations Among Classroom Environment Scales and the Classroom Assessment Technique Scale

Faculty and Student Participant Groups (n=239)

Scale	PERS	INV	STCO	SAT	TSKO	INN	IND	CATS
PERS*	1.00							
INV*	0.61	1.00						
STCO*	0.15	0.25	1.00					
SAT*	0.49	0.57	0.31	1.00				
TSKO*	0.39	0.52	0.28	0.74	1.00			
INN*	0.36	0.46	0.16	0.48	0.46	1.00		
IND*	0.33	0.40	0.17	0.21	**0.11****	0.37	1.00	
CATS*	0.36	0.31	0.11	0.45	0.48	0.23	0.12	1.00

Note: **= Not significant at p=0.05 (One-tailed probability)
* PERS = Personalization
* INV = Involvement
* STCO = Student Cohesiveness
* SAT = Satisfaction
* TSKO = Task Orientation
* INN = Innovation
* IND = Individualization
* CATS = Classroom Assessment Techniques

All of the correlation coefficients in Table 15 were statistically significant at $p<0.0500$ with the exception of Individualization crossed with Task Orientation. This may be an indication of the amount of influence that group and team work has in the group of classes involved in the study. Four of the classes involved in the study were working with cooperative learning techniques. Students do not necessarily have to feel that they are being treated as an **individual** to feel that they are on task. Faculty perceive that treating students as members of a **group** can increase task orientation. Most

importantly, all of the 7 scales of classroom environment correlated significantly with the CATs variable.

Next, correlations were run on the classroom environment scales contained in the CUCEI without the CATs scale on the entire control group (faculty and students). The CATs scale was not included for these two groups as they had no experience with Classroom Assessment Techniques. It would be reasonable to assume that all of the variables would correlate as the inventory was designed to look at those aspects of environment that lead to a satisfying, quality environment. The data from these correlations are summarized in Table 16.

Table 16 - Intercorrelations Among Classroom Environment Scales

Faculty and Student Control Groups (n=86)

SCALE	PERS	INV	STCO	SAT	TSKO	INN	IND
PERS*	1.00						
INV*	0.71	1.00					
STCO*	0.49	0.63	1.00				
SAT*	0.80	0.77	0.49	1.00			
TSKO*	0.45	0.38	0.34	0.58	1.00		
INN*	0.57	0.64	0.36	0.58	**0.07****	1.00	
IND*	0.58	0.61	0.45	0.48	0.23	0.51	1.00

Note: **= Not significant at p=0.05 (One-tailed probabilty)

* PERS = Personalization
* INV = Involvement
* STCO = Student Cohesiveness
* SAT = Satisfaction
* TSKO = Task Orientation
* INN = Innovation
* IND = Individualization

Again, all correlations in Table 16 are statistically significant at $p<0.0500$ with the exception of Innovation correlating with Task Orientation. It would seem that control students and faculty do not see a relationship between Innovation and Task Orientation. These groups may not feel that increases in innovation will **necessarily** positively affect task orientation. The participant groups did perceive a relationship between task orientation and innovation, perhaps because they had been exposed to the innovation of Classroom Assessment. Since the control groups may not have experienced an innovation that affected task orientation, they did not perceive a relationship between the two variables.

To determine whether the application of Classroom Assessment Techniques (CATs) made an impact on classroom environment, the seven classroom environment scales of the CUCEI were summed to give an overall score which was named the Classroom Environment Variable. Correlations were done with the CATs scale and the Classroom Environment Variable.

The use of Classroom Assessment Techniques correlated moderately with the Classroom Environment Variable for the Student Participant group with a statistically significant ($p<0.0001$) correlation coefficient of 0.5335. When the Faculty Participant group was included with the Student Participant group to examine all participants, the correlation coefficient showed a low moderate correlation of 0. 4402. This data is summarized in Table 17.

Table 17 - Correlations Between CATs and Classroom Environment

Group	Classroom Environment Vs CATs	
Student Participant (n=230)	0.5335	$p<0.0001$
Student Participant + Faculty Participant (n=239)	0.4402	$p<0.0001$

T-tests

T-tests were done comparing the classroom environment scales for the Student Participant group and the Student Control group (Table 18). Only two scales showed a significant difference in the means with the Student Participant group scoring higher.

Table 18 - T-tests on Classroom Environment Scales - Student Participant Vs. Student Control Groups

Scale	Mean		t Value	p	Valid N	
	Participant	Control			Participant	Control
Involvement	25.75	24.63	0.797	0.054	230	82
Student Cohesiveness	29.57	28.00	2.484	0.014	230	82

The t-tests summarized in Table 18 show that, with the addition of Classroom Assessment Techniques, students felt slightly more involved in their learning and had a stronger sense of cohesiveness than the control group students. Since four of the student participant classes were also involved in the cooperative learning process, some of this sense of involvement and cohesiveness could be due to this influence.

A set of t-tests were run comparing the means of the classroom environment scales of the CUCEI for faculty with the student means to see if there was a marked difference in perceptions about classroom environment between faculty and students (Table 19). Only two scales showed a significant difference ($p<0.05$) between faculty and students - those of Satisfaction and Innovation. These results must be viewed with a critical eye due to the large difference in numbers between the two groups (Student n=312, Faculty n=13).

Table 19 - T-tests on Classroom Environment Variables - All Students Vs. All Faculty

Scale	Mean		t Value	p	Valid N	
	Students	Faculty			Students	Faculty
Satisfaction	26.11	28.15	-1.16	0.033	312	13
Innovation	22.63	19.00	2.33	0.021	312	13

It would appear that faculty are significantly more satisfied with the classroom environment than their students are (Table 19). This is not unusual; "...instructors perceived their classes more favorably on several environment scales than did their students in the same classrooms (Treagust & Fraser, 1986, p. 16). Faculty often miss the subtle influences that students perceive in the classroom.

Students, on the other hand, are significantly more "impressed" with the innovativeness of their instructors than the instructors are (Table 19). This could be due to the inexperience of the students with the newer methods of enhancing teaching and learning that the instructors view as routine.

T-tests were done comparing the Classroom Environment Variable for the entire participant group (Faculty plus Student Participant groups) and the control group (Faculty plus Student Control groups). There was no significant difference between the measures of the Classroom Environment Variable for either group. Thus, from this study, we cannot assume that the application of Classroom Assessment Techniques, in itself, affects classroom environment significantly. However, the control group was formed by a group of instructors who volunteered to be in the study. These self-selected participants were instructors who were highly thought of in the institute and, not surprisingly, have a positive classroom environment.

The Office Administration Program

Since the Office Administration Program participants were such a large group in the study and had many unique characteristics (exclusively female, isolated on separate campus, CQI environment), some statistical analysis was done investigating this group. First, t-tests were run comparing all eight scales from the modified CUCEI (Personalization, Involvement, Student Cohesiveness, Satisfaction, Task Orientation, Innovation, Individualization and Classroom Assessment Techniques) for the Office Administration Student Participant group and the Non-Office Administration Student Participants (Table 20). With the exception of the Student Cohesiveness and Satisfaction scales, all of the t-tests showed a significant difference ($p<0.05$) with the Office Administration (Office Admin.) participants consistently scoring higher.

Table 20 - T-tests on Classroom Environment Variables - Office Administration Program Participants Vs. All Other Participants

Scale	Mean		t-Value	p	Valid N	
	Office Admin.	Other			Office Admin.	Other
Personalization	29.94	27.66	3.61	0.000	87	143
Involvement	27.49	24.69	5.35	0.000	87	143
Student Cohesiveness	29.66	29.51	0.23	0.817**	87	143
Satisfaction	26.49	25.61	1.05	0.293**	87	143
Task Orientation	28.16	26.57	2.32	0.021	87	143
Innovation	24.14	21.96	3.08	0.002	87	143
Individualization	21.69	18.94	4.52	0.000	87	143
Classroom Assessment	28.83	26.93	2.75	0.007	87	143

Note: **= Not significant

When correlations were run comparing the responses to the Classroom Assessment scale and the Classroom Environment Variable, a moderate (0.5385) and significant ($p<0.0001$) correlation for the Office Administration participant students and a moderate (0.4984) and significant ($p<0.0001$) correlation for the Non-Office Administration student participants were found (Table 21). A t-test was done comparing the Classroom Environment Variable for the Office Administration participant group (faculty and students) and the Non-Office Administration participant group (faculty and

students) (Table 22). There was a significant difference between these two groups at $p<0.0001$ with respect to the Classroom Environment with the Office Administration students scoring higher than the Non-Office Administration students. The question then arose, "Is this a programmatic difference or is it a divisional difference?" So the Office Administration participant group was combined with the other Business Division participants and a t-test was done comparing the measures of the Classroom Environment Variable of this larger group to the classes from the other divisions. There was no significant difference. Thus, the more positive classroom environment appears to be unique to the Office Administration Program. Further research would need to be done to determine which variable or combination of variables (CQI environment, gender, isolated campus, etc.) creates this a unique and very positive environment.

Table 21 - Correlation of CATs and Classroom Environment - Office Administration Program Vs. Other Participants

Group	**Classroom Environment Vs CATs**	
Office Administration (n=87)	0.5385	$p<0.0001$
Other Participants (n=143)	0.4989	$p<0.0001$

Table 22 - T-test on Classroom Environment - Office Administration Program Vs. Other Participants

Variable	Mean		t Value	p	Valid N	
	Office Admin.	Other			Office Admin.	Other
Classroom Environment	187.57	174.94	4.00	0.000	87	143

CATs, Classroom Environment, Gender and the Office Administration Program

When Catlin and Kalina conducted their research using the CUCEI, they found that there was a significant difference in the way females viewed the use of CATs and its impact on classroom environment. With this in mind, correlations and t-tests were done to explore the relationships between the Classroom Environment Variable, the Classroom Assessment Techniques scale, and gender. The statistical analysis that was done moved from the more general groupings of gender through to the more specific relationships between the Classroom Environment Variable and gender considering the impact of the Office Administration Program.

First, t-tests were run on the seven classroom environment scales of the CUCEI for the Student Control group to determine if there was a significant difference in the way males and females view classroom climate generally (Table 23). There was no significant difference on 5 of the 7 scales. Males scored significantly higher on the Task Orientation Scale, whereas females scored higher on the Innovation scale.

Table 23 - T-tests on Classroom Environment Scales for Gender - Control Group (n=82)

Scale	Mean		t Value	p	Valid N	
	Male	Female			Male	Female
PERS*	28.53	28.76	-0.21	0.838	36	46
INV*	25.33	24.09	1.03	0.307	36	46
STCO*	29.06	27.17	1.50	0.137	36	46
SAT*	26.97	26.24	0.49	0.625	36	46
TSKO*	29.25	26.46	2.91	**0.005****	36	46
INN*	20.72	23.39	-2.04	**0.045****	36	46
IND*	19.58	19.17	0.35	0.730	36	46

Note: **= Significant
* PERS = Personalization
* INV = Involvement
* STCO = Student Cohesiveness
* SAT = Satisfaction
* TSKO = Task Orientation
* INN = Innovation
* IND = Individualization

A correlation was run for males and females of the Student Participant group relating the Classroom Assessment Techniques scale with the Classroom Environment Variable (Table 24). The purpose was to determine if there was a significantly stronger relationship between CATs and Classroom Environment when one considered gender. There was no significant difference in the correlation coefficients for males (0.4183) and females (0.4220) when correlating CATs and classroom environment. That is, both correlations were low moderate.

Table 24 - Correlations Between CATs and Classroom Environment - Student Participant Group - Male Vs. Female

Group	Classroom Environment Vs CATs	
Male Student Participant (n=82)	0.4183	$p<0.0001$
Female Student Participant (n=156)	0.4220	$p<0.0001$

When t-tests were done comparing the means of the scores of the scales on the CUCEI for all **Student Participants** (Table 25), females (n=151) scored significantly higher ($p<0.05$) than males (n=78) on all of the scales with the exception of Satisfaction. When one compares this result to the Student Control group (Table 23), where females score significantly higher than males only on the scale of Innovation, it would appear that CATs did affect the females more positively than the males.

Table 25 - T-tests on Classroom Environment Scales for Gender - All Student Participants (n=229)

Scale	Mean		t Value	p	Valid N	
	Male	Female			Male	Female
Personalization	27.63	29.01	-2.09	**0.0380****	78	151
Involvement	24.22	26.52	-4.18	**0.0000****	78	151
Student Cohesiveness	28.44	30.16	-2.73	**0.0070****	78	151
Satisfaction	24.96	26.44	-1.72	0.0862	78	151
Task Orientation	25.36	28.13	-4.03	**0.0001****	78	151
Innovation	21.09	23.69	-3.60	**0.0004****	78	151
Individualization	18.96	20.44	-2.32	**0.0212****	78	151
Classroom Assessment	26.26	28.41	-3.06	**0.0025****	78	151

** = Significant $p<0.05$

Due to the large influence of Office Administration student participants on the larger female group, they were removed and t-tests were done again on all of the scales (Table 26). Now, only Student Cohesiveness, Task Orientation, and Innovation showed significant differences with the Non Office Administration females scoring these variables higher than males.

Table 26 - T-tests on Classroom Environment Scales for Gender - Non Office Administration Student Participants (n=142)

Scale	Mean		t Value	p	Valid N	
	Male	Female			Male	Female
Student Cohesiveness	28.53	30.69	-2.70	**0.008****	77	65
Task Orientation	25.38	28.02	-2.92	**0.004****	77	65
Innovation	21.09	23.05	-2.13	**0.035****	77	65

** = Significant $p<0.05$

When we compare the gender differences between all student participant males and females who belong to the smaller sample of Non Office Administration students, and all the female participants including the Office Administration Program students (Table 27), it would appear that some of the differences that could appear to be due to gender are due to the influence of the Office Administration Program. It is interesting to note that the Classroom Assessment and Satisfaction scales did not show a significant difference in any t-test; both males and females think highly of the use of CATs and are satisfied with the classroom environment.

Table 27 - A Comparison of T-test Significance By Gender

Scale	Non Office Administration Females Vs All Males	All Females (Including Office Administration) Vs All Males
Personalization		Females Significantly Higher
Involvement		Females Significantly Higher
Student Cohesiveness	Females Significantly Higher	Females Significantly Higher
Satisfaction		
Task Orientation	Females Significantly Higher	Females Significantly Higher
Innovation	Females Significantly Higher	Females Significantly Higher
Individualization		Females Significantly Higher
Classroom Assessment		Females Significantly Higher

Summary of College and University Classroom Environment Inventory Findings

In summary, the data gathered by the modified forms of the College and University Classroom Environment Inventory (CUCEI) indicate the following findings.

1. For the Student and Faculty Participant groups in the study, all of the classroom environment scales correlate positively with each other and with Classroom Assessment Techniques with the exception of Individualization vs. Task Orientation. Students do not necessarily have to feel they are being treated as an *individual* to perceive that they are on task. That is, students perceive that *groups* can be task oriented (Table 15).

2. For the Student and Faculty Control groups, Innovation does not correlate significantly with Task Orientation. Control subjects do not feel that increasing the amount of innovation in the classroom will *necessarily* increase the level of task orientation (Table 16).

3. The use of Classroom Assessment Techniques (CATs) correlates moderately with the Classroom Environment Variable with a statistically significant ($p<0.0001$) correlation coefficient of 0.5335 (for the Student Participant group) (Table 17).

4. Students feel more involved in their learning when Classroom Assessment is used in their class (Table 18).

5. Students in this study had a stronger sense of Cohesiveness - that is the "extent to which students know, help and are friendly toward each other" (Treagust & Fraser, 1986, p. 8). This could be due to the application of CATs, but also could be due to the cooperative learning techniques that were being used in some of the participant classes (Table 18).

6. Faculty appear to be significantly more satisfied with the classroom environment than their students are (Table 19).

7. Students perceive their instructors to be more innovative than the instructors perceive themselves to be (Table 19).

8. Office Administration students enjoy a significantly more positive Classroom Environment ($p<0.0001$) having scored significantly higher ($p<0.05$) on the Personalization, Involvement, Task Orientation, Innovation, Individualization and Classroom Assessment Techniques scales of the modified CUCEI that Non Office Administration participant students. This positive classroom environment appears to be unique to the Office Administration Program as the larger, more inclusive Business

Division group of participants did not show this significantly more positive classroom environment (Table 20).

9. Males and females generally view classroom environment similarly (as determined by the Student Control group in this study)(Table 23).

10. Both males and females perceptions of classroom environment are affected similarly by the application of Classroom Assessment Techniques (CATs) (Table 24). (That is, the correlation coefficient of the Classroom Environment Variable correlating with CATs was low moderate for both genders.)

11. The application of Classroom Assessment Techniques affected female participants more than male participants when one compares the t-tests of the Student Participant group (Table 25) to the t-tests of the Student Control group (Table 23). Some of the positive effect can be explained by the influence of the Office Administration Program on a large number of the female participants.

In the next section of the chapter, we begin to specifically look at faculty's experience with Classroom Assessment Techniques during the duration of this study. We will look at both faculty and students' perceptions of the applicability of CATs as an appropriate tool for quality improvement in the classroom.

Classroom Assessment Techniques Used by Faculty

Faculty were asked which Classroom Assessment Techniques they used and how often. These are summarized in Table 28.

Table 28 - Classroom Assessment Techniques Used By Participant Faculty (n=10)

Classroom Assessment Technique	Number of times applied	Percent %
Background Knowledge Probe	11	20.37
Muddiest Point	7	12.96
Minute Paper (Clearest and muddiest points)	6	11.11
Teacher designed feedback form	6	11.11
Course Related Self-Confidence Survey	4	7.41
Classroom Opinion Polls	3	5.56
Assignment Evaluation	3	5.56
Pro and Con Grid	2	3.70
One sentence summary	2	3.70
RSQC2	2	3.70
Exam Evaluation	2	3.70
Empty outlines	1	1.85
Memory Matrix	1	1.85
Concept Mapping	1	1.85
What's the principle?	1	1.85
Group Instructional Feedback Technique	1	1.85
Group-work Evaluation	1	1.85
Total	**54**	**100**

From the previous table, it is apparent that the Background Knowledge Probe was used by virtually all of the instructors in the sample. This is due to the fact that the researcher suggested the use of the Background Knowledge Probe as an acceptable "First CATs" to kick off the study and the semester. Many instructors already use some form of the probe so found it an easy and timely CAT. In addition, at the regularly scheduled support meetings, instructors shared the CATs they had used and how they were received by students. As a result of this sharing, instructors often used CATs that had worked well for others. Also, at the meetings, the researcher facilitated a presentation of the "Featured CAT of the Week" and instructors would tend to try that CAT after it had been presented.

Frequently Used and Most Helpful CATs

Instructors were asked why particular CATs were used more than once. Instructors said that the Muddiest Point and Minute Paper assessments were popular because of their convenience and ease of use. They take little or no preparation, analysis of the results is easy and quick, and very valuable information is received by the instructor. "They were quick and easy & provided info that I could act on quickly to direct the course. If I missed something, these let me know" (Participant). One instructor used the Opinion Poll as a pre- and post-test to determine if there was a shift of opinion on the part of the students. One instructor designed and used two Teacher-Designed Feedback Forms "to assess student preferences and opinions on new delivery of instruction method" (Participant) This instructor was using cooperative learning techniques with students and was probing their response to these techniques.

Although some of the simpler CATs were used a great number of times, when instructors were asked which CAT was the most helpful to them and their class, they most often focused on the assessments which take more time in preparation, application, analysis and feedback. It would seem that when faculty really focus on what they want to get out of the assessment, they are most pleased with the result.

One instructor used an adapted Empty Outline to improve students' learning process in capturing a large amount of material from their classmates. The Memory Matrix was used by the students to organize large amounts of material and they found this helped to fit all the concepts together. The Assignment Assessment was commented on by two instructors who found this CAT was a good way to monitor the amount of work an assignment required and how much learning was gained by the use of the assignment.

Instructors who used an Exam Evaluation for their midterm exams were pleased with the results. One instructor had a small class and so did not receive many suggestions for improvement, but found that students' affirmation of the appropriateness of the exam format and questions valuable. Another instructor felt this CAT allowed students to feel more involved in the process of exam preparation.

Instructors commented on the value of the Course-Related Self-Confidence Surveys. One felt that the use of the survey averted a morale problem because the instructor was able to address the students' feelings of insecurity that were discovered through the use of the probe. Another used the results of the survey to focus on those skills and concepts that students identified as needing more work. Thus the class was able to use its time more wisely. A third instructor identified a gap in instruction and was able to fill that gap in a timely fashion.

Difficulties Encountered In the Use of CATs

When instructors were asked which assessments provided the least helpful information, the responses revealed some of the problems with using assessments without being fully prepared. One instructor used the opinion poll to gather results but the issue that was addressed was one over which the class and instructor did not have control so the class and the instructor were simply frustrated by gathering the data and then not being able to act on it. This highlights the need of instructors to ask "What will I do with the

information I receive from this assessment?" when choosing and designing the CAT (Steadman, 1994). Another instructor commented that the use of the Minute Paper was too rushed with insufficient explanation given to students. This was simply due to inexperience in planning and applying CATs. Students do need to be trained in the use of CATs and the purpose of doing a CAT be made very explicit and overt. This will give more reliable feedback that focuses on the purpose being addressed by the CAT.

Several instructors said that all the CATs that they used were valuable adding the caveat, "as long as the students were honest." This points out the need to promote trust when applying CATs. By reporting to students the results of the CATs and using these results in an honest and open manner to improve learning, without responding defensively, students will begin to trust the process and become more open and honest with their feedback An instructor comments "Sometimes students do not complete the CATs as diligently and completely as I would like. (Students think that)... 'evaluations are more work for me to do'...(but) Once the students see that their comments make a difference in the classroom, they are more willing to make detailed comments." Classroom assessment has a synergistic quality. As students begin to trust that their comments will be taken seriously, they begin to make more reflective and well-thought-out responses that an instructor can respond to more effectively. As these improvements take effect, the synergistic effects increase and the classroom environment becomes even more positive.

When responding to the modified CUCEI only one faculty member agreed with the statement "The use of CATs was difficult for me." To gain more information, instructors were asked on the open-ended Faculty Participant Questionnaire what problems or difficulties they encountered when using CATs. Instructors commented on the need for the questions asked (whether in an opinion poll or assignment evaluation) to be very specific. General questions did not reveal elements that could be improved upon. A participant commented, "(I) had to be very specific or (I) got all kinds of info!

Sometimes, I asked for feedback too soon and they didn't know yet, what they didn't know!" In response to the question - what did you do to overcome the difficulty, this participant responded, "(I) learned to ask specifics and phrase questions to obtain the info I wanted." A second instructor echoes these comments, "(I had problems) stating a question which is specific enough to get valid feedback. (I overcame this by) thinking about how the students might answer." Training, experience and dialogue with peers will allow faculty to become adept at asking good questions.

In addition to the skill required to ask good questions, instructors had difficulty with finding enough time to incorporate the assessments into their courses at a time when the assessments would provide the best data. On the modified College and University Classroom Environment Inventory (CUCEI), three members agreed that CATs was a time-consuming process. Instructors in this study commented many times in the support meetings about the heavy demands of their teaching loads (indeed, several instructors cited this as their reason for withdrawing from the study) and often instructors joked at the support meetings about how they had done their assessment the previous day because they knew they would have to report at the meeting. In response to the question "What problems or difficulties did you encounter in the use of CATs?" an instructor responded "Insufficient planning (by myself) on which CATs to use and when - they were used in preparation for our CAT group meetings, rather than being incorporated into the course planning." Others replied, "Making time," and "Building it into the lesson. Time factor. Analysis later was time consuming." However, when asked how they overcame the obstacle the same instructors commented, "(Reminded myself that) the student does benefit" and "(Researcher's) expectations that I would use CATs helped me to ensure I used them. I learned to do the analysis more effectively over time." This comment reinforces the need for support meetings to help instructors deal with the frustration of learning a new behavior and dealing with assessments while still inexperienced and slow.

Factors Identified To Support the Effective use of CATs

Faculty were asked two questions about factors that would support their use of Classroom Assessment Techniques. They were asked what factors they identified as **necessary** and those that are **helpful**. A summary of the results are presented in Table 29.

Table 29 - Factors Necessary and Helpful to Support CATs

Factor	Number of Times Mentioned	
Student Support - Trust	5	21%
Instructor Attitude - Openness to change	4	17%
Reporting Results Back to the Class	3	13%
The Handbook - Training	3	13%
Support Group - Peer Meetings	2	8%
Administrative/Management Support	2	8%
Pre-planning of Instruction to include CATs	2	8%
Time	2	8%
More instructors using	1	4%
Total	24	100%

The two most mentioned factors focus on the relationship between the instructor and his/her students. Instructors recognize that the success of Classroom Assessment is a shared responsibility. Students must be encouraged to respond to assessments honestly and to trust the instructors' motivation. The faculty in this study recognized the value of completing the feedback loop and reporting the data gathered back to the class. Instructors can build on each successful Classroom Assessment; "(The) instructor must

value the process and share responses (+ and -) with the class" (Participant). The necessary trust is built "If the students are made to feel that they are an integral & valuable part of a team (they & the instructor) whose goal is to improve teaching & learning and that there are no hidden agendas. When they reach that point, they "buy" into the process and learning becomes 'cooperative'" (Participant).

The next five factors in the table focus on management details. Accessibility to support in the form of a copy of the Handbook (Angelo & Cross, 1993), peer support groups and management endorsement and approval are important to faculty. They also recognize the need to preplan activities such that the assessments become a routinely used system in the class. Instructors see the need to embed CATs in their lessons, "Design instruction with specific CATs included in the lesson/unit plans"(Participant). Time is a factor in the use of CATs. Instructors need "Sufficient Time - (for) preparation/student energy/ evaluation" (Participant).

Instructors would like to see the process become common as this would aid in the effective use of CATs. If students were used to completing assessments in the majority of their classes, no individual instructor would have to invest a lot of time in training the students. "If it was commonplace, the students would be used to it, better prepared as to what is expected from them." Also, if students could see that the process is supported by their entire program, they are much more likely to trust the process.

Instructors Would Recommend the Use of CATs to a Colleague

To determine the strength of instructors commitment to the use of Classroom Assessment Techniques (CATs) to improve the teaching and learning situation, instructors were asked if they would recommend the use of CATs to a colleague. Unanimously, they said that they would recommend the use of CATs.

"Results are invaluable," comments one instructor. "I believe it (CATs) to be an enhancement to the learning process," comments another. Faculty see the use of the assessments to be a method of improving the communication between the instructor and the students. "(The use of CATs) provides on-going communication with the students on the effectiveness of instruction" (Participant). "It's great to get an overall view of the class attitude & thinking... They will write things they would never say" (Participant).

Instructors recognize the value of a positive classroom environment and would use that to convince a colleague to try CATs. "(Classroom Assessment) improves the atmosphere in the class & the trust level between me & my students. As well, I get honest feedback re content knowledge" (Participant).

Being sensitive to the need for a positive instructor attitude, one instructor stated that he would recommend the use of CATs to a colleague, but he added a caveat: "Yes, but only if the colleague was serious about taking the time to do them, and felt secure enough to really be willing to change their lessons to improve their classes."

Benefits of Using CATs Identified by Instructors

When asked to identify the greatest benefits that instructors discovered about the application of Classroom Assessment Techniques to their classes, the majority of instructors commented on the "Instant feedback from the students" (Participant) as the biggest benefit. Instructors recognized the benefits of improved communication. "Improved communication between students and instructor, leading to better learning climates" (Participant). CATs can improve the students' sense of efficacy; "(The use of CATs) Involves the class more and makes their opinions count for something" (Participant).

Instructors found the feedback rewarding because it gave them more understanding of what was happening with their students. "(The use of CATs) kept

things in perspective...usually it was only a few who weren't 'getting it,' not the whole class" (Participant). "I get honest feedback re content knowledge" (Participant). The use of CATs "Increased awareness of the distance there can be between what I perceive I am teaching and the students are learning and what they are actually learning" (Participant).

All of the benefits that instructors mention are interpersonal in nature. Further study would have to be done to determine if there is a benefit to students that is reflected in higher grades.

Drawbacks in the Use of CATs

The responses to the question "In your opinion, what was the greatest drawback(s) of using CATs?" overwhelmingly, focused on the issue of time. Instructors are feeling the pressure of full timetables and heavy instructional demands and, although they recognize the benefits of the use of Classroom Assessment, are very cognizant of the amount of time the skillful application of CATs demands. Instructors see time as a barrier; "Time constraints due to content-learning courses and increased instructor workloads" (Participant).

Other concerns that were identified in response to this questions were not really drawbacks of CATs, but rather concerns that can be overcome with experience. For example, "In one case, the feedback suggested changes that I couldn't make, I wasn't sure how to deal with that" (Participant), or "knowing which CAT to use"(Participant). One instructor was concerned about the possibility of instructors responding to the feedback in a defensive and therefore destructive way, "Some instructor(s) may take the feedback wrong" (Participant).

CATs and the Quality of the Teaching and Learning Experience

Instructors persisted through the difficulties because they saw the benefit to their classes. When asked "In your opinion, did the use of CATs improve the quality of the teaching and learning in your class?" every instructor replied with a resounding yes.

Through the analysis of instructor comments, it was clear that the assessments were often used to focus on student learning. When using such CATs, the instructors could identify concepts that were unclear, confused or indeed, missed completely. Instructor comments included, "The muddiest point CAT, for example, allowed us to go back and clear up areas where students were struggling," and "The RSQC2 showed that during the class surveyed, most students were confused. I used this information and went back to the class & revisited the area that was causing confusion." "The self-confidence survey told (showed) me that I forgot to teach a skill."

Classroom Assessment Techniques were used by some of the instructors to sense students response to the process of the instruction. One instructor commented "At the start of semester, I was going too fast, I didn't realize how much the material would need to be broken down. - the CATs made it clear which areas needed to be emphasized." CATs that focus on process were used to monitor the implementation of new instructional strategies. In response to the question about the improvement of quality, an instructor replied "Yes, (the use of CATs improved the quality of the class) especially with respect to the new process of coop(erative) learning."

Instructors recognized the effect the use of CATs had on the classroom environment for learning in the class. They felt it improved the quality of the student learning experience. "Students felt their opinion was valued and important, therefore increased commitment to being in class and being successful" (Participant).

Classroom Assessment was used to promote student cognition by enabling the students to organize concepts and clarify their thinking about those concepts. "The muddiest point was helpful re content and review," comments an instructor. Another states, "They (the CATs) helped students to consolidate information (minute paper/pros-cons) and reflect on their experiences and strengths (assignment assessment/self-confidence survey.)"

In addition to sensing a more quality instructional experience, instructors were asked about their actual teaching behavior to determine if the assessments actually prompted instructors to act. Instructors were asked "Did you change your planned instruction due to the feedback received from students?" Two instructors did not make any changes during the period of this study due to the feedback received through the assessments. One instructor's class requested less homework and the instructor felt that this was not a viable option. This reinforces the fact that an instructor can recognize feedback that he/she does not agree with, and does not necessarily have to act on it. This instructor explained to the class that the homework was needed and he did not feel that he could reduce it and maintain the level of learning. The second instructor commented, "No, (I did not make changes to my instruction), but the feedback confirmed some future directions that I want to incorporate." So, even though no changes were made for improvement during the period of the study, the instructor had plans to change future instruction.

The remaining instructors did respond to the feedback by altering what they did in the classroom. The instructors report: "They wanted more student involvement - I am now trying to give them that" and "I gave more detailed instructions (written) & tried to do more demo's." The vast majority of the changes commented upon by instructors had to do with reviewing confusing or complicated material: "I postponed teaching a new lesson until the 'confusing material was cleared up and the students felt comfortable;" "I'll be reviewing certain theories before the final exam & I might not have done so

otherwise;" "(I) would review past material if necessary, but without CAT may not have done this." It seems clear that with all these changes, instructors ensured that students had more opportunity to use instructional time in the way that most benefited them.

CATs as a Tool for Improving Quality

To solicit comments about instructors' views of CATs as a tool for improving the quality of the teaching and learning situation, instructors were asked, "In you opinion, is CATs an appropriate tool for the improvement of the teaching and learning process in the classroom?" The responses were very positive.

Instructors responded: "Yes, I need to know if they are learning what they have to and students must feel involved & responsible for their learning - If they are taking part in it and can see changes, they become more involved;" and "YES. If an instructor truly desires to improve teaching & learning in the classroom, CATs provides the tools that can be used to implement and measure the processes. Its so great to have all these ideas in a book right at hand." Instructors even addressed the issue of time. "With sufficient planning to include CATs, they can be used without severe time allotments. They are convenient and simple assessment tools."

Instructors perceive that CATs encourage students to become more involved in their learning and more responsible for that learning. "Some of the CATs can be used to encourage students' understanding of why certain instruction/assignments were employed, while others encourage student processing of material learned. All of the CATs involve active, rather than passive, student involvement and this will encourage learning. Basically, the students become more involved in the process of learning through the use of CATs" (Participant). "If students are allowed to provide input on the learning process, they will generally strive to ensure they benefit from improvements and feel part of the process" (Participant).

The instructors in this study heartily endorse CATs as tool for the improvement of the quality of teaching and learning.

Faculty Perception of CATs as a Continuous Quality Improvement (CQI) Tool as Found by the CUCEI

Faculty also showed their support of the use of Classroom Assessment Techniques as a tool for improving the quality of the teaching and learning process in their completion of the modified College and University Classroom Environment Inventory. The faculty inventory contained 11 statements that directly related to the use of CATs. Two of the items, "The use of Classroom Assessment Techniques in my classroom contributed to an improvement in the teaching and learning process" and "In my opinion, CATs is an effective tool for improving the teaching and learning process" showed 100% of the responses being in the Agree or Strongly Agree category.

From the inventory, faculty seemed to negate any difficulties they were experiencing in the application of CATs as only one faculty member agreed with the statement "The use of CATs was difficult for me." Three members agreed that CATs was a time-consuming process. The support of the CATs meetings was appreciated by all of the faculty as they agreed or strongly agreed that they enjoyed the sharing of information that occurred at the meetings. All of the faculty that participated in this study plan to use CATs again and would recommend the use of the process to their colleagues. All but one plan to introduce CATs to all of their classes. Faculty generally feel more effective in the classroom through the use of CATs (90%) and are energized and excited (70%) about their teaching when using CATs. Faculty responses are summarized in Table 30.

Table 30 - Faculty CUCEI Responses Regarding CATs

Statement	Strongly Agree	Agree	Disagree	Strongly Disagree
• The use of CATs in my classroom contributed to an improvement in the teaching and learning process.	3	7	0	0
• The use of CATs was difficult for me.	0	1	7	2
• CATs is an easy tool to use.	4	5	1	0
• The use of CATs is a time-consuming process.	1	2	7	0
• I will use CATs again	6	4	0	0
• I plan to introduce CATs to all my classes.	3	6	1	0
• I would recommend the use of CATs to a colleague.	3	7	0	0
• The use of CATs made me feel more effective in the classroom.	4	5	1	0
• I enjoyed the sharing of information with my colleagues in our CATs meetings.	4	6	0	0
• I feel more excited about my teaching since I have started using CATs.	3	4	3	0

Statement	Strongly Agree	Agree	Disagree	Strongly Disagree
• In my opinion, CATs is an effective tool for improving the teaching and learning process.	6	4	0	0

Student Perception of CATs as Found by the CUCEI

Students also had very strong opinions about the use of CATs in the classroom. A summary of their responses is tabulated in Table 31. Over 75% of participant students agreed or strongly agreed that the use of CATs in their class improved the quality of their educational experience in that class. Participant students found that the time used during class in the gathering and reporting of assessments to be time well spent as 93% of them disagreed or strongly disagreed with the statement "Classroom assessment is a waste of time." Over 86% of students felt that CATs was an important tool to aid in the communication between students and instructors and 82.61% of them felt that CATs enabled them to feel more involved with their learning. Students were so impressed with CATs as an instructional, communication tool that over 83% of students felt all instructors should use Classroom Assessment and almost 88% would choose to be in a class with an instructor who is using CATs if they had a choice.

This support of the use of Classroom Assessment Techniques by students is an important finding. Students' enthusiasm for the use of CATs as an appropriate means to improve their learning experience provides us with information about the student customers' response to the use of the tools of Classroom Assessment. Although, to the researcher's knowledge, this is the first study that directly explores the student customers' response to Classroom Assessment as a Continuous Quality Improvement tool, Kelly

(1991, 1992, 1993) and Steadman (1994) report similar positive student responses to CATs.

Table 31 - Student CUCEI Responses Regarding CATs (n=230)

Statement	Strongly Agree	Agree	Disagree	Strongly Disagree
• Classroom assessment is a waste of time.	3	11	116	98
Percent	1.30%	4.78%	50.43%	42.61%
• Classroom assessments allowed me to communicate in a positive way with my instructor.	83	116	24	5
Percent	36.09%	50.43%	10.43%	2.17%
• If I had a choice, I would choose to be in a class with an instructor who uses classroom assessments.	92	110	21	4
Percent	40.00%	47.83%	9.13%	1.74%
• The use of classroom assessments had little or no effect on my learning.	11	52	126	37
Percent	4.78%	22.61%	54.78%	16.09%

Statement	Strongly Agree	Agree	Disagree	Strongly Disagree
• The use of classroom assessments made me feel more involved in my learning.	62	128	30	8
Percent	26.96%	55.65%	13.04%	3.48%
• The use of classroom assessments improved the quality of my educational experience in this class.	38	135	44	11
Percent	16.52%	58.70%	19.13%	4.78%
• All instructors should use classroom assessments.	87	104	20	7
Percent	37.83%	45.22%	8.70%	3.04%

If we make the assumption that the Office Administration Program students are unique, not only because they are exclusively female, but also because of the distinct CQI culture in that program, and remove them from the data set, we find that the results of the CATs questions change very little (Table 32). Over 70% of Student Participants agreed or strongly agreed that the use of CATs in their class improved the quality of their educational experience in that class as compared to 75% for the larger participant sample. All other results are virtually the same with the exception of "All instructors should use classroom assessment." Non-Office Administration participant students felt even stronger (87% as compared to 83% that all instructors should indeed use this tool.

Table 32 - Non-Office Administration Student CUCEI Responses Regarding CATs (n=143)

Statement	Strongly Agree	Agree	Disagree	Strongly Disagree
• Classroom assessment is a waste of time.	0	8	73	58
Percent	0.00%	5.76%	52.52%	41.73%
• Classroom assessments allowed me to communicate in a positive way with my instructor.	43	76	17	5
Percent	30.50%	53.90%	12.06%	3.55%
• If I had a choice, I would choose to be in a class with an instructor who uses classroom assessments.	55	68	13	4
Percent	39.29%	48.57%	9.29%	2.86%
• The use of classroom assessments had little or no effect on my learning.	8	39	76	16
Percent	5.76%	28.06%	54.68%	11.51%

Statement	Strongly Agree	Agree	Disagree	Strongly Disagree
• The use of classroom assessments made me feel more involved in my learning.	33	79	23	6
Percent	23.40%	56.03%	16.31%	4.26%
• The use of classroom assessments improved the quality of my educational experience in this class.	19	80	33	9
Percent	13.48%	56.74%	23.40%	6.38%
• All instructors should use classroom assessments.	52	68	13	5
Percent	37.68%	49.28%	9.42%	3.62%

Conclusion

This chapter has summarized the results of the open-ended survey completed by participant faculty in this study around their perceptions of Classroom Assessment Techniques (CATs) as well as the data gathered with the Modified College and University Classroom Environment Inventory (CUCEI). The first section dealt with demographic information and results around classroom environment gathered using the Modified CUCEI. The second section of the chapter dealt with the perceptions of faculty about the application of CATs and faculty and student perceptions of the appropriateness of CATs as a quality improvement tool. Discussion and recommendations around the findings presented in Chapters IV are presented in the following chapter.

CHAPTER V - DISCUSSION AND RECOMMENDATIONS

Assessment would be very different if college teaching were viewed as an ongoing reciprocity among students, instructors, and materials, a collaborative venture with shared responsibility for what goes into a class and what comes out of it.

Evaluation would be built into the daily routine. Participants would often ask and answer questions such as:

"What did we intend to do today?

How did we go about it?

What helped or hindered our progress?

Do our goals need redefining? What will students learn about their learning from this CAT? What is my definition of "improved student learning"? Will this activity help students synthesize, organize, or retain new information? How can I help students transfer learning behaviors from this CAT to other settings?

Is everyone getting a fair chance to learn?

Is everyone carrying his/her weight?" (Lauer, 1993, p. B4).

Introduction

This chapter discusses the findings of the study in two groupings: (a) those that deal with classroom environment and, (b) those that address the applicability of CATs as a quality improvement tools. Following a discussion of the major findings, areas of future research are identified. This chapter concludes with recommendations evolving from the findings.

Classroom Assessment Techniques and Classroom Environment

This research was not designed to determine whether the use of Classroom Assessment Techniques (CATs) causes an improvement in classroom environment for a particular class or for a particular instructor. This researches compares the classroom

environment of classes in which CATs was applied to classes that had no such exposure to CATs. In this research, comparison of these environments showed no statistically significant difference. This finding may be due, in part, to the fact that the control group consisted of self-selected members. Instructors who self-select for such an activity are already concerned with the quality of their students' educational experience as witnessed by their interest in the study. This interest may translate into a caring attitude in the classroom which would help to create a more positive classroom environment.

The use of Classroom Assessment Techniques, however, correlates with all of the classroom environment scales on the modified College and University Classroom Environment Inventory (CUCEI). Participant students feel significantly more involved in their learning with the use of CATs. This is consistent with the findings of Catlin and Kalina (1993). Stetson's (1991) report that "students were more actively involved in learning" (p. 125) when faculty were using CATs is echoed by Obler, Slark and Umbdenstock (1993), Kelly (1991, 1992, 1993) and Steadman (1994).

The use of Classroom Assessment has a greater impact on females' perception of classroom environment than males. Although correlations of CATs with the Classroom Environment variable showed no difference between males and females in the Student Participant group (Table 24), when we compare t-tests between the control (Table 23) and the participant group (Table 25) some interesting findings are revealed. The control group shows a statistically significant difference between males and females in their perceptions of innovation (females higher) and task orientation (males higher). When Classroom Assessment is applied, however, females score higher on all scales except that of Satisfaction. That is, females have a more positive perception of Personalization, Involvement, Student Cohesiveness, Task Orientation, Innovation and Individualization than males in classes where CATs is applied. CATs causes women to be much more satisfied with classroom environment than classes that do not use CATs. This is consistent with the literature that states that female students find the environment in a

male-dominated, "technical," environment "chilly" (Bayley, 1992; Burge & Culver, 1990; Canadian Teachers' Federation, 1990; Ehrhart & Sandler, 1987; Gainen, 1995; Kock, 1990; Kramarae & Treichler, 1990; Mura, Kimball & Cloutier, 1987; Overdijk, 1990; Sadker & Sadker, 1990; Sax, 1992; Sloat, 1990). Thus, it is logical that a communication tool like CATs will be welcomed more enthusiastically by women. This finding is important for educational institutions to recognize in light of the findings of Williams (1990) and Horvath (1992). Williams found that the classroom environment perceived by female students in post-secondary learning institutions affects their participation in class. Horvath (1992) studied persistence of female students in an introductory economics course and concluded that female students need to overcome classroom climate. CATs can be used to make females feel more welcome in a male-dominated environment.

In this light, it is interesting to consider the Office Administration Program. Since this program is exclusively female, the "chilly climate" effect should not be present. The program enjoys a much more positive perception of classroom environment than the other classes in the study (Table 22). If this finding could have been predicted, it would have been interesting to have a control class selected from Office Administration to determine the effect of CATs while controlling for the variables of gender, isolated campus and CQI environment. Unfortunately, without such a control group, one cannot conclude which factor most affected classroom environment in this study for the Office Administration Program participants.

This study confirms that faculty tend to have a more positive perception of classroom climate than their students do (Table 19). Although the number of faculty involved in the study is small (14), there is a statistically significant difference in their view of classroom environment as compared to their students. This is consistent with the findings of Treagust and Fraser (1986). "...(I)nstructors perceived their classes more

favorably on several environment scales than did their students in the same classroom" (p. 16).

Waxman (1991) connects what we know about classroom environment, improvement and classroom assessment:

> There are several areas in the study of learning environments that hold promise for improving education. One aspect, for example, that is especially promising is 'teacher as researcher' or 'survey feedback' projects, where teachers receive systematic feedback or classroom profiles from their own class(es) and consequently change their classroom instruction or learning environment. Several studies have found that teachers can improve their classroom environment be receiving such feedback and then through reflection and/or discussion and intervention improve their classroom environment (Fraser & Fisher, 1986; Fraser, Seddon, & Eagleson, 1982). (p.2).

Thus classroom environment and instruction can be improved through the use of CATs.

Classroom Assessment Techniques as a Continuous Quality Improvement Tool

> Regardless of the disciplines, college teachers have many concerns in common One concern we share is for the quality of students' learning... Interested in improving student learning, many of them (faculty) experiment with new teaching approaches, but find it difficult to tell if their modifications make a difference. ...faculty need accurate, well-focused information on student learning throughout the semester. Classroom Assessment Techniques (CATs)... offer college teachers an effective way to monitor and improve the quality of student learning (Cottell, 1991, p. 43).

Instructors in this study were highly motivated to aid their students in their pursuit of learning. The CATs applied were used to gather information about what the students were learning and whether the process that the instructor was applying was suitable for the students. Assignments and exams were evaluated and opinion polls taken. Overall, instructors received a great deal of data that they could use for the improvement of the teaching and learning process.

Instructors repeatedly supported the use of CATs as an appropriate quality improvement tool for the context in which they work. They felt their use of CATs impacted their teaching in a positive way. The majority of instructors in this study modified their planned instruction as a result of data gathered with an assessment. Classroom assessment influenced instructors to improve the instructional process.

The faculty in this study recognize the value of completing the feedback loop and reporting the data gathered back to the class. The reporting to students of the results of the feedback gathered facilitates two important processes. First, this reporting to students makes students responsible for their comments and overtly validates their comments. This validation promotes positive classroom climate. Secondly, because feedback will be reported to students, the instructor is encouraged to analyze the feedback for themes. Without the commitment to share information with students, it would be far too easy to quickly peruse the data and then ignore it. The analysis and reporting the findings makes the data useable. "Measurement without feedback is just data; feedback without measurement is just opinion" (Seymour, 1994, p.75). The closure of the feedback loop is critical to the process of improvement.

There is a metacognitive goal for instructional staff that is met by the use of CATs. The use of Classroom Assessment Techniques is equivalent to using the Shewhart Cycle of Plan, Do, Check, Act. The behavior at a micro level in the classroom prepares the instructor for the kind of thinking that is necessary for the completion of large projects at the macro level. The leaders of the Cuyahoga Community College in Cleveland, Ohio state, "It is our contention that the enhancement of those research skills within the faculty are a necessary precondition for a full institutional commitment to CQI" (Brown & Jelfo, 1994, p. 4). "Before propagating the philosophy of TQM through the organization, the application of a few simple tools at the working level can serve to mold behaviour" (Jablonski, 1991, p. 7). Thus the use of CATs can be a training ground for faculty to hone their quality improvement skills in preparation for larger projects.

Students felt that the use of CATs improved the quality of their learning. In a CQI environment, a process which improves the quality of a customer's experience is to be valued. Because the process is analogous to the Shewhart Cycle (Plan, Do, Check, Act) it is consistent with the literature on quality improvement. "Classroom assessment is designed to improve the productivity of teachers and students through continuously focusing the attention of both on the quality of students' learning. Merging management-oriented TQM with academically-oriented classroom assessment offers an unprecedented opportunity for addressing the quality challenge" (Cross, 1994, p. 149).

Since the cooperating institution has made a commitment to a CQI/TQM philosophy, it is self-evident that the institution would seek a mechanism to apply this philosophy to the classroom. Marchese (1991) identified 12 themes of TQM/CQI. The following table illustrates the congruence between TQM/CQI and Classroom Assessment Techniques.

Table 33 - CATs is Congruent with TQM/CQI

Themes of TQM/CQI	**Analogous Themes of CATs**
TQM focuses on quality	The best known CAT is the "minute paper" - What did you learn today? Causes students and instructors to focus on quality of the learning
TQM is customer-driven	"The purpose of classroom assessment is to systematically determine how well instruction is meeting student needs" (Cross, 1994, p. 150)
TQM emphasizes continuous improvement	Improvements in instruction can be done "on the fly" rather than responding to the traditional end-of-term student feedback.

Themes of TQM/CQI	Analogous Themes of CATs
TQM concentrates on making processes work better	CATs are designed to make instructors more sensitive to the processes of learning.
TQM reaches in all directions	The use of the background knowledge probe allows instructors to reach backward to assess students previous learning.
TQM involves the discipline of information	CATs is the continuous collection of data.
TQM eliminates rework	Because classroom assessment involves constant checking on understanding, gaps in knowledge are identified and remedied immediately, eliminating the need for remediation.
TQM emphasizes teamwork	The use of assessments creates a sense that all members of the class are a team with a goal of high quality student learning.
TQM empowers people	Classroom assessment empowers instructors and students to "take charge" of the learning process and make it work for those involved.
TQM invests in training and recognition	Classroom assessment is a powerful form of faculty development. Faculty are encouraged to reflect on their process and share with their peers.
TQM requires vision	The first step in the use of CATs is instructors identifying their teaching goals

Themes of TQM/CQI	Analogous Themes of CATs
TQM requires leadership	Classroom assessment succeeds best on campuses where there is strong leadership in support of quality instruction.

Because of the evidence in the literature, it was expected that the faculty in the study would support the use of Classroom Assessment. Students' support for the process was an interesting finding. The majority of the students in this study found their instructor's use of CATs to have a positive impact on their educational experience. Students like the process and would choose to be in a class where an instructor is using CATs. The use of CATs is a method by which the cooperating institution can meet the needs of its student customers and, indeed, may even exceed their expectations. This student customer support of Classroom Assessment Techniques as appropriate quality improvement tools is an important reason for the use of CATs to be encouraged throughout the cooperating institution.

Instructors identified factors that are helpful in the implementation of Classroom Assessment. An atmosphere of trust must be established to allow the assessments to be as effective as possible. Instructors recognize that the success of this process is not in their hands alone. Students must be invited to be partners in the system of improving the teaching and learning in the class. If the instructor is open to change and willing to value the input of the students, trust will emerge. The careful planning and implementation of CATs and the feeding back of data to the class, begins to build the trust required to enable the process to work effectively. Instructors can build on each successful Classroom Assessment; "(The) instructor must value the process and share responses (+ and -) with the class" (Participant). Eventually, the class becomes a team with the instructor as their leader working in a true CQI environment. "If the students are made to feel that they are an integral & valuable part of a team... whose goal is to improve teaching & learning and

that there are no hidden agendas. When they reach that point, they "buy" into the process and learning becomes 'cooperative' " (Participant).

Instructors would like to see the process become common as this would aid in the effective use of CATs. If students were used to completing assessments in the majority of their classes, no individual instructor would have to invest a lot of time in training the students. "If it was commonplace, the students would be used to it, better prepared as to what is expected from them." Also, if students could see that the process is supported by their entire program, they are much more likely to trust the process.

Problems for Further Research

During the process of this study, areas of further research became apparent. The following are a number of problems that have been identified for future research.

1. What effect does the use of Classroom Assessment Techniques have on objective measures of student learning such as grades, skill development and graduation rates?
2. What factors create the highly positive classroom environment of the Office Administration Program at the cooperating institution?
3. What factors encourage, support and facilitate the spread and growth of the use of Classroom Assessment in an institution?
4. How can faculty be encouraged, motivated and aided to expand their use of Classroom Assessment into Classroom Research?
5. What factors encourage, support and facilitate the use of Classroom Research to address questions about teaching and learning?

Recommendations

Student Feedback on Instruction and Classroom Assessment

Recommendation: *The introduction, use, and support of Classroom Assessment Techniques should be formalized and instituted as one strategy of an overall Student Feedback on Instruction System.*

During 1995, a study was done at the cooperating institution that looked specifically at the Student Feedback on Instruction (SFI) system which is presently used to gather data regarding students' perceptions of the quality of instruction. Corbett-Lourenco (1995) reports that one of the "primary objectives of the process at (the cooperating institution) (is to provide) formative feedback to the instructor"(p.3).

Unfortunately, Corbett-Lourenco also reports that some instructors feel that "it is an administrative task; political...get it done" (p.7). Students commented that "students who attend on a regular basis are the only ones who should complete" (p.8) because they felt that the instructor should pay attention to the responses of students who consistently attend and not to the comments of "poor [skipping] students (who) make negative comments or are complainers" (p.8). When asked if the SFI instrument reflected a true assessment, instructors felt that "students lack maturity" (p.9) and "students use it as a tool of revenge to discredit an instructor"(p. 9). As to whether or not the data that was collected was used and acted upon for the improvement of instruction, Corbett-Lourenco found that as time goes on, it is acted upon minimally by faculty. In addition, there is minimal feedback to students because there is no feedback loop designed into the system. All of these issues are addressed by CATs. Only students who are in attendance complete Classroom Assessments. By disclosing the data to students, the "revenge" weapon is taken away from students. They see that vengeful comments do not initiate productive

change. Also, the fact that the data is reported to students keeps the instructor accountable to act on, or at least explain inaction to, specific suggestions.

In her presentation Corbett-Lourenco recommends that the process of Student Feedback on Instruction should be reviewed to "clearly differentiate between formative and summative feedback" (p. 12). Certainly, feedback gathered for formative purposes should not be used for summative purposes. In addition, Corbett-Lourenco recommends that the cooperating institution implement a system consistent with the Plan, Do, Check, Act cycle (Shewhart cycle). The use of Classroom Assessment Techniques is congruent with the Shewhart cycle. Classroom Assessment should be implemented at the cooperating institution and supported by management to provide formative feedback to instructors.

Support for Applying Innovations to the Classroom

Recommendation: *Classroom Assessment/Research support groups (teaching circles) should be organized and supported for faculty who are implementing innovations in their classrooms.*

When new techniques are introduced into the classroom, faculty are feeling somewhat discomforted by the process due to its unfamiliarity. This may lead to the appearance of being disorganized, unprepared and tentative. This may not be the case, but due to the unfamiliarity of the territory the instructor is venturing into, this unsureness may be communicated to students. Students are alerted to the instructor's tentativeness and often respond negatively as they perceive that the instructor is not clear about what he/she is doing.

In addition, students have clearly formulated expectations of what the teaching and learning process should look like. They expect a lecture and homework and to work as an individual with little or no interaction with their peers and limited interaction with

their instructor. Their expectations are based on their prior experience which is often exclusively traditional. Thus, when first exposed to new techniques, the students often respond with a great deal of defensiveness and may even become hostile.

These attitudes can cause a valuable teaching tool to be discarded before it has had an opportunity to prove its worth. This relates to Bandura's self-efficacy theory. Turner & Dirkx (1993) apply Bandura's theory to the adoption of innovations by faculty:

> Bandura...argues that perceived self-efficacy plays an important role in behavioral changes. The self-efficacy of participants in staff development can have a direct influence on the choice of activities or strategies. Efficacy expectations will determine how much effort people will expend and how long they will persist in the fact of obstacles. Consequently, self-efficacy theory can be helpful in describing individuals reactions to change. If individuals feel they do not have sufficient command or understanding of a ... particular method or strategy, it is unlikely they will attempt to make practice changes in that area, or if they do attempt change, it is more likely they will be frustrated by barriers or obstacles (p. 203).

With this in mind, faculty need strong support for their attempts to integrate new techniques (cooperative learning), new forms of feedback (Classroom Assessment), and efforts to improve the quality of teaching and learning. To gain this support, faculty need to be prepared to seek assistance from various sources. The institution must provide systems that can offer support.

Kozma (1979) identified factors that influence the adoption and dissemination of classroom innovations in higher education. "These factors include the: 1) informal network (social interaction), 2) formal network (resources and consultants) 3) intrinsic reward (satisfaction derived from the activity) and 4) extrinsic reward (such as the encouragement of administrators)" (Steadman, 1994, p. 205).

The teaching circle - a group of faculty who meet regularly to discuss an aspect of the teaching and learning process - is a very valuable method of using the informal network to support in implementation of innovations. Through the teaching circle,

participants gain a sense of camaraderie and interconnectedness with other faculty. Faculty speak about their experiences, explore relevant literature and learn from each other. Dialogue enables deep processing of information and is considered by the researcher to be a requirement for critical thinking. "...One of the major benefits of participating in the program (a classroom research pilot project) was the crystallization and refinement of my overall goals, objectives and desired outcomes. A second major benefit was the opportunity, within a structured setting, to carry out the assessments aided by continuous and constructive feedback and encouragement from colleagues" (Nakaji, 1991, p. 80). "Faculty report that they enjoy the contact and the richness of talking with each other on substantive issues in teaching and learning. Regular meetings and time for problem solving are an integral part of the training model..." (Obler, Slark & Umbdenstock, 1993 , p. 220).

Instructors in this study commented on the need for the questions asked (whether in an opinion poll or assignment evaluation) to be very specific. General questions did not reveal elements that could be improved upon. Instructors need help in framing questions that will give them the data they need to improve teaching and learning. One of the best ways for instructors to get this help is through their peers reviewing the assessment before it goes to students. That is, faculty could use a teaching circle or some other form of support group as a "pilot" group. This would help them identify the problems with the questions and allow them a resource group in helping to frame the questions in a more useable way. Steadman (1994) illustrates how a teaching circle could encourage reflective practice and summarizes her perspective in her Table 6b (p. 224).

Facilitators of Classroom Assessment groups can help faculty consider if their current practice is contributing to the achievement of teaching and Classroom Assessment goals.... The table below combines commonly reported purposes for using Classroom Assessment with questions to promote reflective practice.

Table 6b: Questions to Promote Reflective Classroom Assessment Practice

Purposes for Using CATs	Questions to Consider about Potential CATs
To obtain feedback on teaching and classroom activities	What do I expect to learn about my teaching? What teaching practices or class activities do I want feedback on?
To improve teaching	What skills am I interested in improving? How will I use feedback to make changes in teaching?
To monitor student learning	What will I learn about student learning? Will I have to change presentation format or review based on CAT results?
To improve communication and collaboration with students.	How does this CAT offer students a voice and a stake in controlling the class?
To improve student learning.	What will students learn about their learning from this CAT? What is my definition of "improved student learning"? Will this activity help students synthesize, organize, or retain new information? How can I help students transfer learning behaviors from this CAT to other settings?

Steadman, 1994, p. 224.

Instructors need the resource of their peers to critique their assessments to make them as appropriate as possible for the improvement of the teaching and learning situation. Instructors need to practice their critical thinking with respect to the questions used in

their assessments. Without the proper assessment/questions, instructors will not get the information that they are seeking and need to make improvements.

It is of primary importance that the teaching circles or support groups connote a positive image (Berry, Filbeck, Rothstein-Fisch, & Saltman, 1991). No one is interested in joining an activity that hints at being aimed at a group of ineffective teachers in need of help. Choosing a positive name for the activity, perhaps Classroom Research Group, or Classroom Assessment Group, would connote a positive image. In keeping with the Continuous Quality Improvement aspect of Classroom Research, Classroom Quality Improvement Group might be an appropriate title.

Faculty should seek support from their supervisors before embarking on their journey of innovation. Notifying supervisors of one's intent to begin incorporating an innovation has a number of benefits. Firstly, a supervisor cannot offer support and encouragement to the instructor if they are uninformed about what the instructor is doing. Secondly, informing the supervisor of the intent to incorporate innovations brings a deeper commitment to following through on the intention when the process gets difficult, time-consuming or discomforting. Knowing that the supervisor will be asking about the innovation provides motivation to follow through. Thirdly, if students react negatively to the innovation (which is predictable due to the nature of change), the administrator is less likely to see student complaints as an indication of poor quality instruction. Also, if the administrator is the person who has "primary responsibility for evaluating ... instructional activities, ...he should understand what I (the instructor) was doing and why" (Cottell, 1991, p. 44). Involvement of the supervisor allows the instructor to tap into the external source of motivation referred to by Kozma (1979).

Further, any formal or informal organization of faculty that are involved in incorporating innovative practice, be it cooperative learning techniques or Classroom Assessment/Research, could be coordinated through the department of Staff Training and

Development to tap into the knowledge of the organization (Watkins & Marsick, 1993). This would allow faculty access to just-in-time training and support as needed as they move through the implementation process. This would incorporate Kozma's (1979) finding that access to training and expert support is one of the four cornerstones to the implementation and dissemination of innovative practice.

Field reports of innovations and the results should be written by participant faculty and made available to other faculty. This could be supported by Staff Training and Development or a new unit such as a Center for Teaching Excellence. Faculty would then have a resource to refer to when they are planning their innovation. Certainly there are a large number of published articles and research reports that could be of value to faculty, but reports generated by peers in the same organizational culture are invaluable. They provide contextual, credible data that can inspire others to incorporate innovations into their teaching repertoire. This recording, reporting, and subsequent use of information builds a "Learning Organization" culture (Watkins & Marsick, 1993; Senge, 1990). In addition to the public benefit, the instructor receives a great deal of personal benefit by being required to maintain a log and submitting reports. Writing provides a method of personal reflection. The thinking that is involved in expressing one's experience in the written word aids deep processing, reinforces the learning experienced by the instructor and provides an opportunity to analyze the process from a different perspective removed from the "heat of the moment" in the classroom.

Promoting Classroom Assessment Practice to Improve *Student Learning*

Recommendation: *Instructors be supported and encouraged to move beyond using Classroom Assessment to improve instruction to the use of Classroom Assessment practice to improve* ***student learning***.

Classroom Assessment is an excellent tool for improving the quality of the teaching and learning situation. The faculty involved in this study are intrinsically motivated to help others learn. However, they, as well as the vast majority of faculty in the cooperating institute, possess little background knowledge in theories of teaching and learning. Most are untrained in approaches to help students transfer what they have learned about learning from their experience with Classroom Assessment to other learning situations (Steadman, 1994).

Unfortunately, transfer of learning from one situation to another is not as automatic as educators have historically assumed. Instructors constantly bemoan the poor ability of their students to apply a concept they have learned in one situation to another situation. Thus, faculty need to be explicit to students about the potential applications of Classroom Assessment Techniques to varying learning situations. To be able to do so, instructors need to be familiarized with the relationship between CATs and cognitive learning theory.

Although the text Classroom Assessment Techniques: A Handbook for College Teachers (Angelo & Cross, 1993) provides references and resources that provide the background cognitive theory for the assessments, instructors rarely have the time to pursue those references to increase their knowledge. The descriptions of the assessments themselves in the Handbook provide an outline of how the assessment fits with cognitive theory, but again, faculty need to make these connections overt for themselves and their students. To enable faculty to use Classroom Assessment to actively enhance learning strategies for students, in a learning circle structure, a facilitator could help faculty to make the connections more explicit by involvement in application activities.

One possible application activity would require faculty to design short learning strategy lessons to accompany a few of their favorite CATs (Steadman, 1994). For example, the faculty in this study used the "Muddiest Point" and "The Minute Paper"

(clearest and muddiest point) a total of 13 times. Instructors ask students to reflect on their learning and outline what they understood and what they did not. Students take a few moments to write down their reflections, then share this feedback anonymously with the instructor. This assessment forces students to reflect on their classroom learning and assess the level of comprehension of new information. "...This process reinforces (collaborative learning) environment...The process also has the added advantage that when it is used regularly the students begin to think about their one minute paper during class in anticipation of being asked what they learned and this helps them focus on the concepts as well as the skills they are dealing with" (Panitz, 1995, p.1).

As part of a small group application activity, faculty would consider what learning strategies the assessments "Muddiest Point" and "Minute Paper" are related to, such as metacognition. Next, faculty would develop a simple definition of the learning strategy for students, and generate additional recommendations for using the strategy outside of class. Small group activities like this one can provide faculty with practice in building connections between Classroom Assessment and learning theory, and making these connections explicit to students.

When instructors embark on their journey for using CATs as a tool for improving the teaching and learning in their classes, they should be encouraged to complete the Teaching Goals Inventory in Angelo and Cross' Handbook (1993). With information in hand regarding their goals for a class, instructors can better choose and design CATs that allow them to pursue their teaching and learning goals.

The opportunity for reflection on questions related to their goals or other questions raised by group members or facilitators provide faculty the opportunity to engage in critical thinking around their teaching practice. "In addition, exposure to other faculty's goals for Classroom Assessment and teaching practice may lead faculty to refine and expand their own goals" (Steadman, 1994, p. 214).

Creating connections between CATs and student learning will not suit all faculty. Some faculty, depending on their goals will use CATs exclusively for feedback on instruction. This section is included to promote a consideration of the expansion of the use of Classroom Assessment **beyond** that of improvement of *instruction* to improvement of *learning*. The beauty of Classroom Assessment lies in the fact that it can be designed to meet faculty's individual goals and interests.

Role of Administrative Leadership and Support

Recommendation: *Administration should formally and informally support the implementation and use of Classroom Assessment.*

Any program of faculty development or Continuous Quality Improvement requires the visible support of administration for it to succeed. There will always be a group of individual faculty that will access programs due to the inner motivation for improvement. For a program to succeed on a campus-wide basis, however, faculty need to be encouraged to become involved and stay involved in Classroom Assessment projects. "Getting people to do not just one thing right, but to adopt the new behavior as a consistent way of working, takes a long time" (Atkinson, 1990, p. 47).

The president and vice-presidential levels of administration need to encourage Deans to support programs of Classroom Research throughout their schools. Program Heads could organize teams of faculty in their programs to embark on quality improvement projects using Classroom Research. The importance of such work could be communicated to the faculty by including a category about Continuous Quality Improvement in the classroom on annual evaluations. Consideration for the time and effort such improvement takes should be recognized by taking Classroom Research activity into account in workloads. A facilitator and/or team leader should be assigned to organize and support teams, quality circles, teaching circles and individuals in their work

with Classroom Research and Quality Improvement. This person would need to bring "personal credibility and visibility on issues and concerns of teaching and learning, the authority to promote and reward faculty development efforts, and the capacity to provide necessary funding and administrative support" (Berry, et al. 1991, p. 94).

Communicating information about successful Classroom Research/Classroom Quality Improvement projects is a mode by which the use of the process of Continuous Quality Improvement could be celebrated and spread throughout the campus. Reports about successful projects could be included in CQI publications and faculty newsletters.

Cuevos (1991) states

> If the concept of classroom feedback/research is to be successfully implemented at the community college level, there needs to be an institutional support system to facilitate faculty research activities. This support system may involve:
>
> - networks for faculty to assist each other in the development and implementation of assessment strategies,
> - availability of a variety of assessment "tools" which can be readily used or adapted to learning/teaching situations,
> - assistance with data analysis,
> - availability of "model" instructional strategies which faculty can use to follow-up assessment results, and
> - release time for classroom research
>
> (p. 389).

Assessment tools can be provided by making available Angelo and Cross's text Classroom Assessment Techniques, 1993 edition. Indeed, faculty in this study identified access to this text as a requirement for the success of the use of Classroom Assessment. "Model" instructional strategies and advice on modifying strategies can be gained through faculty support groups and from the Staff Training and Development group.

Faculty in this study identified "Administrative support and encouragement" as important for the success of the use of Classroom Assessments for the improvement of

instruction. It would seem reasonable and necessary to support and reward those people who strive for excellence in their classrooms. K. Patricia Cross outlines what administrators can do to improve teaching.

> Classroom research has its own built-in incentives, because the process itself is intellectually challenging, promotes discussion and recognition across disciplinary and even institutional boundaries, and enhances the status and satisfaction of teaching. There are, however, many things administrators can do to encourage classroom research, including the following:
>
> 1. Devise a promotion and tenure system that recognizes teaching performance and efforts to engage in professional activities such as classroom research.
>
> 2. Provide and support opportunities for teachers to engage in classroom research, individually, in small clusters of interested and motivated faculty, and as an important aspect of departmental improvement and evaluation.
>
> 3. Provide opportunities for teachers to increase their knowledge base and gain professional recognition through attendance at professional meetings and participation in graduate-level courses or faculty development activities emphasizing the collection and analysis of classroom research.
>
> 4. Promote local discussions of classroom research projects affording teachers an opportunity to share designs and findings and to receive local recognition for participation in growth-enhancing professional development.
>
> (1990, p. 140).

What Would An Assessment-Oriented Institution Look Like?

Recently, the Government of Alberta has initiated funding of educational institutions based on Key Performance Indicators (KPIs). As a result of this shift in funding, institutional assessment is becoming the norm for postsecondary institutions in Alberta. Institute-wide assessment is supported by the Continuous Quality Improvement paradigm. What would an assessment-oriented institution look like?

If an institution were to commit itself to its talent development mission and attempt to implement a comprehensive assessment program designed to further that mission, how would such an institution change? How would its climate for learning and teaching differ from the typical institution? Below are just a few of the many ways in which such an institution might be unique.

- The environment will be characterized by a widespread spirit of inquiry and self-study. The comprehensive student data base will provide a common tool for all members of the community - students, administrators, faculty, and staff - to engage in a continuous process of self-examination.
- A much higher priority will be given to teaching, advising, mentoring, and similar institutional functions that are designed to enhance talent development.
- There will be a much greater spirit of experimentation and innovation, not only to improve areas of institutional functioning that are found to be in need of change, but also because a built-in mechanism for assessing the effectiveness of innovations (the data base) will be available.
- More of the faculty's expertise in research and scholarship will be devoted to studies of teaching, learning, and student development.
- Discussions about pedagogy will become more commonplace.
- Rigid lines between departments and disciplines will begin to break down.
- Hiring of faculty and administrators will give greater weight to the candidate's interest in and capacity to enhance the talent development function.
- Administrators will be expected to be educational leaders rather than mere managers.

Astin 1991 p. 251, 252.

A Perspective for the Future

Faculty's use of Classroom Assessment Techniques improves the quality of students' learning experience. The techniques are appropriate tools for assessing teaching and learning products and processes. Groups of faculty using CATs provide a forum for the investigation of teaching and learning, critical thinking and reflection, and a celebration of quality learning and instruction. As faculty get more involved in a process

that is intrinsically motivating, they feel revitalized and interested in their classes once again. The culture of the organization begins to change as instructors begin to build their belief system to accommodate the attitude that improvement is not only possible, but also rewarding. Faculty can begin to build "a belief system that spreads hope...that results from the act of pursuing personal involvement and sharing power - a feeling of self-determination" (Seymour, 1995, p. 162). "Personal involvement in the classroom, along with the idea that enabling students to influence their environment has a direct effect on (faculty's) willingness and ability to perform, is (an attitude) that is long overdue on most campuses" (Seymour, 1995, p. 168). Students feel more involved in their learning when Classroom Assessment Techniques are being used. As a component system of an institutional culture focused on Continuous Quality Improvement, the continued use, support and promotion of Classroom Assessment has the potential to move the institution forward on its journey of Continuous Quality Improvement.

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APPENDIX

A. Consent Form and Information Documents for Participants

Name **Division** **Phone Number**

Please indicate your preference by putting an X in the blank by the appropriate statement.

_____ I would be interested in participating in the study of Classroom Assessment Techniques.

_____ I would like more information about participating in the study of Classroom Assessment Techniques.

_____ I am not interested in participating in the study of Classroom Assessment Techniques.

CLASSROOM ASSESSMENT TECHNIQUES RESEARCH

Here is an exciting opportunity for you to apply the knowledge you have just gained in this workshop. In cooperation with Staff Training and Development and the Faculty of Educational Policy Studies, I am conducting research for the completion of my Master's degree. Faculty who are selected for the project will have the opportunity to continue to apply CATs with the support of myself and their peers. You and your classes will experience increased learning, and increased involvement in the teaching and learning process. Your involvement in this project will give you information about how your class perceives the classroom environment after the application of CATs. Your involvement will provide data to NAIT about the applicability of CATs as a tool to improve the teaching and learning process in the classroom

Only sixteen faculty will be selected to participate in this project by applying CATs. All interested faculty are asked to sign a potential participant list. The sixteen faculty will be selected at random from the pool of names of their division. Thus four faculty will be selected from each division.

Faculty participants will be asked to:

1. Select a class in which they will use CATs.
2. Apply a minimum of five CATs to that class.
3. Complete with the class a survey to assess classroom environment.
4. Complete a survey exploring faculty perceptions of the applicability of CATs as a tool to improve teaching and learning in the classroom.
5. Participate in a maximum of four meetings during the fall semester, 1995, at a time to be determined by the group.

Faculty participants are assured that:

1. All data will be kept confidential by the researcher.
2. Participants have the right to opt out of the study at any time, for any reason.

Please consider being involved in this exciting and significant opportunity to increase the teaching and learning effectiveness in your classroom. With minimum effort on your part, you can contribute to the growing body of knowledge about a method of improving classroom instruction. I deeply appreciate your contribution.

Elaine Soetaert
471-7465 (work)
459-3133 (home)

CONSENT FORM - FACULTY PARTICIPANTS

Thesis Title: Continuous Quality Improvement in the Classroom - Classroom Assessment Techniques

Researcher: Elaine Soetaert
University of Alberta
Faculty of Education
Department of Educational Policy Studies

This is to certify that I agree to participate in the above study. Having been contacted by the researcher, a graduate student in the Department of Adult Career and Technology, and a faculty member in my institution, I understand that:

1. The purpose of this study is to explore the applicability of Classroom Assessment Techniques (CATs) as devised by Thomas Angelo and K. Patricia Cross as a quality improvement tool for the classroom. The study will survey staff and student perceptions of classroom environment and the applicability of CATs as a Continuous Quality Improvement Tool.
2. My name will not be used in the resulting thesis.
3. Any information I provide to the researcher will be kept confidential and used solely for the purposes of this research study. No information will be released to a third party unless requested by me in writing to the researcher.
4. I am participating in this study on a purely voluntary basis. Therefore, I have the right to quit or refuse to participate at any time.
5. The results of the study will be made available to me.
6. I have been fully informed as to the nature of the study and my involvement in it.
7. The thesis this study leads to will be available for examination at the University of Alberta Library.

Signature of participant _____ Date _____

Consent Form - Student Participants
Thesis Title: Continuous Quality Improvement in the Classroom - Classroom Assessment Techniques
Researcher: Elaine Soetaert

This is to certify that I agree to participate in the above study. Having been contacted by the researcher, a graduate student in the Department of Adult Career and Technology, and a faculty member in my institution, I understand that:

1. The purpose of this study is to explore the applicability of Classroom Assessment Techniques as a quality improvement tool for the classroom
2. I will not be identified in any way, except as a member of this class. I understand that the results of my class's surveys will be shared with my instructor, but no individuals will be identified.
3. Any data I provide to the researcher will be kept confidential and used solely for the purposes of this research study.
4. I am participating in this study on a purely voluntary basis. Therefore, I have the right to quit or refuse to participate at any time. My participation or non-participation in the study will not affect my status in class or my grades in any way.
5. I have been fully informed as to the nature of the study and my involvement in it.

Signature of participant _____ Date _____

Consent Form - Student Participants
Thesis Title: Continuous Quality Improvement in the Classroom - Classroom Assessment Techniques
Researcher: Elaine Soetaert

This is to certify that I agree to participate in the above study. Having been contacted by the researcher, a graduate student in the Department of Adult Career and Technology, and a faculty member in my institution, I understand that:

1. The purpose of this study is to explore the applicability of Classroom Assessment Techniques as a quality improvement tool for the classroom
2. I will not be identified in any way, except as a member of this class. I understand that the results of my class's surveys will be shared with my instructor, but no individuals will be identified.
3. Any data I provide to the researcher will be kept confidential and used solely for the purposes of this research study.
4. I am participating in this study on a purely voluntary basis. Therefore, I have the right to quit or refuse to participate at any time. My participation or non-participation in the study will not affect my status in class or my grades in any way.
5. I have been fully informed as to the nature of the study and my involvement in it.

Signature of participant _____ Date _____

Continuous Quality Improvement - Classroom Assessment Techniques

Participant Classes

This is an open letter to be read to your participant class approximately one week prior to the administration of the College and University Classroom Environment Inventory.

During this semester, we have been using a technique called Classroom Assessment Techniques (CATs) that allows you to give me, your instructor, feedback that gives me information that can be used to improve the teaching and learning process. This has been done as part of a study managed by a graduate student in the Education Faculty at the University of Alberta and a NAIT staff member. I have agreed to allow her to gather data about the classroom environment in this class and information about your perception of Classroom Assessment Techniques as being an appropriate tool for improving instruction in the classroom. This data will be gathered in class in approximately one week's time. It consists of a simple questionnaire similar to the Student Feedback on Instruction form that NAIT uses. The data that is collected will be used to help NAIT make decisions about how to improve the teaching and learning process. You can make a substantial contribution to the growth of NAIT as a world-class teaching institution through your participation in the study. The data will also be used by the researcher to complete her Master's thesis. In addition, the information about the class's perception of classroom environment will be shared with me, your instructor.

If you wish to contribute to the betterment of the teaching and learning process at NAIT, I encourage you to be involved in this study by completing the questionnaire that you will receive in class. You will be given an opportunity to opt out if you so wish. All data will be gathered anonymously. You will not be identified in any way. Identification numbers will be added to your response sheets after you complete the survey simply to track this specific class as a unit. Your participation or non-participation in this study will not affect your status in this class nor your grades in any way.

If you have any questions, please feel free to contact the researcher, Elaine Soetaert, directly. Her number is 459-3133.

Thank you for your contribution!

Continuous Quality Improvement - Classroom Assessment Techniques

Control Classes

This is an open letter to be read to your class approximately one week prior to the administration of the College and University Classroom Environment Inventory.

During this semester, a number of instructors at NAIT have been involved in a study that looks at the use of Classroom Assessment Techniques (CATs) and its effect on classroom environment. This has been managed by a graduate student in the Education Faculty at the University of Alberta who is also a NAIT staff member. I have agreed to allow her to gather data about the classroom environment in this class so that she can use the data as a control for comparison. This data will be gathered in class in approximately one week's time. It consists of a simple questionnaire similar to the Student Feedback on Instruction form that NAIT uses. Overall, the data that is collected for this study will be used to help NAIT make decisions about how to improve the teaching and learning process. You can make a substantial contribution to the growth of NAIT as a world-class teaching institution through your participation in the study. The data will also be used by the researcher to complete her Master's thesis. In addition, the information about the class's perception of classroom environment will be shared with me, your instructor.

If you wish to contribute to the betterment of the teaching and learning process at NAIT, I encourage you to be involved in this study by completing the questionnaire that you will receive in class. You will be given an opportunity to opt out if you so wish. All data will be gathered anonymously. You will not be identified in any way. Identification numbers will be added to your response sheets after you complete the survey simply to track this specific class as a unit. Your participation or non-participation in this study will not affect your status in this class nor your grades in any way.

If you have any questions, please feel free to contact the researcher, Elaine Soetaert, directly. Her number is 459-3133.

Thank you for your contribution!

Introductory Script

Student Control Classes

Your instructor has already informed you I am sure, about the study that I have been doing here at NAIT this semester, in part to finish my Master's degree.. A number of instructors have been involved in a study that looks at the use of Classroom Assessment Techniques and its effect on classroom environment. I am a graduate student in the Education Faculty at the University of Alberta who is also a NAIT staff member. Your instructor has agreed to allow me to gather data about the classroom environment in this class so that I can use the data as a control for comparison. What I need you to do is to complete a simple questionnaire similar to the Student Feedback on Instruction form that NAIT uses. In fact, similar to the way that NAIT does, the information about the class's perception of classroom environment will be shared with your instructor. Overall, the data that is collected for this study will be used to help NAIT make decisions about how to improve the teaching and learning process. You can make a substantial contribution to the growth of NAIT as a world-class teaching institution through your participation in the study.

I want you to understand that by completing this questionnaire, you will be contributing to the betterment of the teaching and learning process at NAIT. This questionnaire will easily be completed in less than 40 minutes. All information will be gathered anonymously. You will not be identified in any way. Identification numbers will be added to your response sheets after you complete the survey simply to track this specific class as a unit. Your participation or non-participation in this study will not affect your status in this class nor your grades in any way. Anyone who feels that they do not wish to participate in this study may leave now.

If you have any questions, after the completion of this questionnaire, please feel free to contact me, Elaine Soetaert, directly. My number is 459-3133.

I ask all of you who have remained to complete the Consent form and when you have returned it to me, I will give you a copy of the questionnaire booklet and the answer sheet. Please do not make any marks in the questionnaire booklet.

Thank you very much for your participation in this study.

Introductory Script

Student Participant Classes

During this semester, this class, as well as several others throughout the institute have been using a technique called Classroom Assessment Techniques (CATs) that allows you to give your instructor feedback that can be used to improve the teaching and learning process. This has been done as part of a study that I have been managing as part of my Master's thesis. I am a graduate student in the Education Faculty at the University of Alberta and a NAIT staff member. Your instructor has agreed to allow me to gather data about the classroom environment in this class and information about your perception of Classroom Assessment Techniques as being an appropriate tool for improving instruction in the classroom. You will be asked to complete a simple questionnaire similar to the Student Feedback on Instruction form that NAIT uses. Similar to the manner in which NAIT does, the information about this class's perception of classroom environment will be shared with your instructor. The data that is collected will be used to help NAIT make decisions about how to improve the teaching and learning process. You can make a substantial contribution to the growth of NAIT as a world-class teaching institution through your participation in the study.

If you wish to contribute to the betterment of the teaching and learning process at NAIT, I encourage you to stay today and complete the questionnaire that you will receive. It will easily be completed in under 40 minutes. All information will be gathered anonymously. You will not be identified in any way. Identification numbers will be added to your response sheets after you complete the survey simply to track this specific class as a unit. Your participation or non-participation in this study will not affect your status in this class nor your grades in any way. Anyone who feels that they do not wish to participate in this study may leave now.

If you have any questions, after the completion of this questionnaire, please feel free to contact me, Elaine Soetaert, directly. My number is 459-3133.

I ask all of you who have remained to complete the Consent form and when you have returned it to me, I will give you a copy of the questionnaire booklet and the answer sheet. Please do not make any marks in the questionnaire booklet.

Thank you for your contribution!

APPENDIX

B. Modified College and University Classroom Environment Inventory

MODIFIED COLLEGE AND UNIVERSITY CLASSROOM ENVIRONMENT INVENTORY (CUCEI) - CONTROL STUDENT

Directions:

The purpose of this questionnaire is to find out your opinions about the class you are attending right now.

This questionnaire is designed for use in gathering opinions about classes at universities or colleges.

This form of the questionnaire assesses your opinion about what this class is actually like. Indicate your opinion about each questionnaire statement by filling in the appropriate boxes on the response form with the letter of your choice.

Write A if you STRONGLY AGREE that the statement describes what this class is actually like

Write B if you AGREE that the statement describes what this class is actually like

Write C if you DISAGREE that the statement describes what this class is actually like

Write D if you STRONGLY DISAGREE that the statement describes what this class is actually like

1. The instructor considers students' feelings.
2. The instructor talks rather than listens
3. The class is made up of individuals who don't know each other well.
4. The students look forward to coming to class.
5. Students know exactly what has to be done in our class.
6. New ideas are seldom tried out in this class.
7. All students in the class are expected to do the same work, in the same way and in the same time.

8. The instructor talks individually with students.
9. Students put effort into what they do in classes.
10. Each student knows the other members of the class by their first names.
11. Students are dissatisfied with what is done in the class.
12. Getting a certain amount of work done is important in this class.
13. New and different ways of teaching are seldom used in this class.
14. Students are generally allowed to work at their own pace.

15. The instructor goes out of his/her way to help students.
16. Students constantly watch the clock in this class in anticipation of its end.
17. Friendships are made among students in this class.
18. After the class, the students have a sense of satisfaction.
19. The group often gets sidetracked instead of sticking to the point.

20. The instructor thinks up innovative activities for students to do.
21. Students have a say in how class time is spent.

22. The instructor makes sure each student who is having trouble with the work receives help.
23. Students in this class pay attention to what others are saying.
24. Students don't have much chance to get to know each other in this class.
25. Classes are a waste of time.
26. This is a disorganized class.
27. Teaching approaches in this class are generally innovative and have variety.
28. Students are allowed to choose activities and how they will work.

29. The instructor seldom moves around the classroom to talk with students.
30. Students seldom present their work to the class.
31. It takes a long time to get to know everybody by his/her first name in this class.
32. Classes are boring.
33. Class assignments are clear so everyone knows what to do.
34. The seating in this class is arranged in the same way each week.
35. Teaching and learning is managed in this class to allow students to proceed at their own pace.

36. The instructor isn't interested in students' problems.
37. There are opportunities for students to express opinions in this class.
38. Students in this class get to know each other well.
39. Students enjoy going to this class.
40. This class seldom starts on time.
41. The instructor often thinks of unusual class activities.
42. There is little opportunity for a student to pursue his/her particular interest in this class.

43. The instructor is unfriendly and inconsiderate towards students.
44. The instructor dominates class discussions.
45. Students in this class aren't very interested in getting to know other students.
46. Classes are interesting.
47. Activities in this class are clearly and carefully planned.
48. Students seem to do the same type of activities every class.
49. It is the instructor who decides what will be done in our class.

The following information is being collected from you only to demonstrate that this class's students are representative of students who attend this institution. Write in the appropriate letter on the answer sheet.

50. Gender	(A) Male	(B) Female		
51. Age	(A) 17-21	(B) 22-26	(C) 27-31	(D) 32+
52. Previous Education	(A) High School	(B) One Year Postsecondary	(C) Two Years Postsecondary	(D) Journeyman

MODIFIED COLLEGE AND UNIVERSITY CLASSROOM ENVIRONMENT INVENTORY (CUCEI) - CONTROL FACULTY

Directions:

The purpose of this questionnaire is to find out your opinions about the class you are attending right now.

This questionnaire is designed for use in gathering opinions about classes at universities or colleges.

This form of the questionnaire assesses your opinion about what this class is actually like. Indicate your opinion about each questionnaire statement by filling in the appropriate boxes on the response form with the letter of your choice.

Write A if you STRONGLY AGREE that the statement describes what this class is actually like

Write B if you AGREE that the statement describes what this class is actually like

Write C if you DISAGREE that the statement describes what this class is actually like

Write D if you STRONGLY DISAGREE that the statement describes what this class is actually like

1. The instructor considers students' feelings.
2. The instructor talks rather than listens
3. The class is made up of individuals who don't know each other well.
4. The students look forward to coming to class.
5. Students know exactly what has to be done in our class.
6. New ideas are seldom tried out in this class.
7. All students in the class are expected to do the same work, in the same way and in the same time.

8. The instructor talks individually with students.
9. Students put effort into what they do in classes.
10. Each student knows the other members of the class by their first names.
11. Students are dissatisfied with what is done in the class.
12. Getting a certain amount of work done is important in this class.
13. New and different ways of teaching are seldom used in this class.
14. Students are generally allowed to work at their own pace.

15. The instructor goes out of his/her way to help students.
16. Students constantly watch the clock in this class in anticipation of its end.
17. Friendships are made among students in this class.
18. After the class, the students have a sense of satisfaction.
19. The group often gets sidetracked instead of sticking to the point.

20. The instructor thinks up innovative activities for students to do.
21. Students have a say in how class time is spent.

22. The instructor makes sure each student who is having trouble with the work receives help.
23. Students in this class pay attention to what others are saying.
24. Students don't have much chance to get to know each other in this class.
25. Classes are a waste of time.
26. This is a disorganized class.
27. Teaching approaches in this class are generally innovative and have variety.
28. Students are allowed to choose activities and how they will work.

29. The instructor seldom moves around the classroom to talk with students.
30. Students seldom present their work to the class.
31. It takes a long time to get to know everybody by his/her first name in this class.
32. Classes are boring.
33. Class assignments are clear so everyone knows what to do.
34. The seating in this class is arranged in the same way each week.
35. Teaching approaches allow students to proceed at their own pace.

36. The instructor isn't interested in students' problems.
37. There are opportunities for students to express opinions in this class.
38. Students in this class get to know each other well.
39. Students enjoy going to this class.
40. This class seldom starts on time.
41. The instructor often thinks of unusual class activities.
42. There is little opportunity for a student to pursue his/her particular interest in this class.

43. The instructor is unfriendly and inconsiderate towards students.
44. The instructor dominates class discussions.
45. Students in this class aren't very interested in getting to know other students.
46. Classes are interesting.
47. Activities in this class are clearly and carefully planned.
48. Students seem to do the same type of activities every class.
49. It is the instructor who decides what will be done in our class.

50. Gender	(A) Male	(B) Female		
51. Age	(A) 25-35	(B) 35-45	(C) 45-55	(D) 55+
52. Educational Background	(A) Journeyman	(B) Technical Diploma	(C) Bachelor's Degree	(D) Post graduate degree
53. Number of Years Teaching Experience	(A) 0 - 3 years	(B) 4 - 6 years	(C) 7 - 10 years	(D) 10+ years
54. Division	(A) Industrial	(B) Health Sciences	(C) Engineering Technologies	(D) Business

MODIFIED COLLEGE AND UNIVERSITY CLASSROOM ENVIRONMENT INVENTORY (CUCEI) - STUDENT PARTICIPANT

Directions:

The purpose of this questionnaire is to find out your opinions about the class you are attending right now.

This questionnaire is designed for use in gathering opinions about classes at universities or colleges.

This form of the questionnaire assesses your opinion about what this class is actually like. Indicate your opinion about each questionnaire statement by filling in the appropriate boxes on the response form with the letter of your choice.

Write A if you STRONGLY AGREE that the statement describes what this class is actually like

Write B if you AGREE that the statement describes what this class is actually like

Write C if you DISAGREE that the statement describes what this class is actually like

Write D if you STRONGLY DISAGREE that the statement describes what this class is actually like

1. The instructor considers students' feelings.
2. The instructor talks rather than listens
3. The class is made up of individuals who don't know each other well.
4. The students look forward to coming to class.
5. Students know exactly what has to be done in our class.
6. New ideas are seldom tried out in this class.
7 All students in the class are expected to do the same work, in the same way and in the same time.

8. The instructor talks individually with students.
9. Students put effort into what they do in classes.
10. Each student knows the other members of the class by their first names.
11. Students are dissatisfied with what is done in the class.
12. Getting a certain amount of work done is important in this class.
13. New and different ways of teaching are seldom used in this class.
14. Students are generally allowed to work at their own pace.

15. The instructor goes out of his/her way to help students.
16. Students constantly watch the clock in this class in anticipation of its end.
17. Friendships are made among students in this class.
18. After the class, the students have a sense of satisfaction.
19. The group often gets sidetracked instead of sticking to the point.
20. The instructor thinks up innovative activities for students to do.
21. Students have a say in how class time is spent.

22. The instructor makes sure each student who is having trouble with the work receives help.
23. Students in this class pay attention to what others are saying.
24. Students don't have much chance to get to know each other in this class.
25. Classes are a waste of time.
26. This is a disorganized class.
27. Teaching approaches in this class are generally innovative and have variety.
28. Students are allowed to choose activities and how they will work.

29. The instructor seldom moves around the classroom to talk with students.
30. Students seldom present their work to the class.
31. It takes a long time to get to know everybody by his/her first name in this class.
32. Classes are boring.
33. Class assignments are clear so everyone knows what to do.
34. The seating in this class is arranged in the same way each week.
35. Teaching approaches allow students to proceed at their own pace.

36. The instructor isn't interested in students' problems.
37. There are opportunities for students to express opinions in this class.
38. Students in this class get to know each other well.
39. Students enjoy going to this class.
40. This class seldom starts on time.
41. The instructor often thinks of unusual class activities.
42. There is little opportunity for a student to pursue his/her particular interest in this class.

43. The instructor is unfriendly and inconsiderate towards students.
44. The instructor dominates class discussions.
45. Students in this class aren't very interested in getting to know other students.
46. Classes are interesting.
47. Activities in this class are clearly and carefully planned.
48. Students seem to do the same type of activities every class.
49. It is the instructor who decides what will be done in our class.

50. Classroom assessment is a waste of time.
51. Classroom assessments allowed me to communicate in a positive way with my instructor.
52 If I had a choice, I would choose to be in a class with an instructor who uses classroom assessments.
53 The use of classroom assessments had little or no effect on my learning.
54. The use of classroom assessments made me feel more involved in my learning.
55. The use of classroom assessments improved the quality of my educational experience in this class.
56. All instructors should use classroom assessments.

The following information is being collected from you only to demonstrate that this class's students are representative of students who attend this institution. Write in the appropriate letter on the answer sheet.

57. Gender	(A) Male	(B) Female		
58. Age	(A) 17-21	(B) 22-26	(C) 27-31	(D) 32+
59. Previous Education	(A) High School	(B) One Year Postsecondary	(C) Two Years Postsecondary	(D) Journeyman

MODIFIED COLLEGE AND UNIVERSITY CLASSROOM ENVIRONMENT INVENTORY (CUCEI) - FACULTY PARTICIPANT

Directions:

The purpose of this questionnaire is to find out your opinions about the class you are instructing right now.

This questionnaire is designed for use in gathering opinions about classes at universities or colleges.

This form of the questionnaire assesses your opinion about what this class is actually like. Indicate your opinion about each questionnaire statement by filling in the appropriate boxes on the response form with the letter of your choice.

Write A if you STRONGLY AGREE that the statement describes what this class is actually like

Write B if you AGREE that the statement describes what this class is actually like

Write C if you DISAGREE that the statement describes what this class is actually like

Write D if you STRONGLY DISAGREE that the statement describes what this class is actually like

1. The instructor considers students' feelings.
2. The instructor talks rather than listens
3. The class is made up of individuals who don't know each other well.
4. The students look forward to coming to class.
5. Students know exactly what has to be done in our class.
6. New ideas are seldom tried out in this class.
7 All students in the class are expected to do the same work, in the same way and in the same time.

8. The instructor talks individually with students.
9. Students put effort into what they do in classes.
10. Each student knows the other members of the class by their first names.
11. Students are dissatisfied with what is done in the class.
12. Getting a certain amount of work done is important in this class.
13. New and different ways of teaching are seldom used in this class.
14. Students are generally allowed to work at their own pace.

15. The instructor goes out of his/her way to help students.
16. Students constantly watch the clock in this class in anticipation of its end.
17. Friendships are made among students in this class.
18. After the class, the students have a sense of satisfaction.
19. The group often gets sidetracked instead of sticking to the point.
20. The instructor thinks up innovative activities for students to do.
21. Students have a say in how class time is spent.

22. The instructor makes sure each student who is having trouble with the work receives help.
23. Students in this class pay attention to what others are saying.
24. Students don't have much chance to get to know each other in this class.
25. Classes are a waste of time.
26. This is a disorganized class.
27. Teaching approaches in this class are generally innovative and have variety.
28. Students are allowed to choose activities and how they will work.

29. The instructor seldom moves around the classroom to talk with students.
30. Students seldom present their work to the class.
31. It takes a long time to get to know everybody by his/her first name in this class.
32. Classes are boring.
33. Class assignments are clear so everyone knows what to do.
34. The seating in this class is arranged in the same way each week.
35. Teaching approaches allow students to proceed at their own pace.

36. The instructor isn't interested in students' problems.
37. There are opportunities for students to express opinions in this class.
38. Students in this class get to know each other well.
39. Students enjoy going to this class.
40. This class seldom starts on time.
41. The instructor often thinks of unusual class activities.
42. There is little opportunity for a student to pursue his/her particular interest in this class.

43. The instructor is unfriendly and inconsiderate towards students.
44. The instructor dominates class discussions.
45. Students in this class aren't very interested in getting to know other students.
46. Classes are interesting.
47. Activities in this class are clearly and carefully planned.
48. Students seem to do the same type of activities every class.
49. It is the instructor who decides what will be done in our class.

50. The use of Classroom Assessment Techniques (CATs) in my classroom contributed to an improvement in the teaching and learning process.
51. The use of CATs was difficult for me.
52. CATs is an easy tool to use.
53. The use of CATs is a time-consuming process.
54. I will use CATs again.
55. I plan to introduce CATs to all my classes.
56. I would recommend the use of CATs to a colleague.
57. The use of CATs made me feel more effective in the classroom.
58. I enjoyed the sharing of information with my colleagues in our CATs meetings.
59. I feel more excited about my teaching since I have started using CATs.
60. In my opinion, CATs is an effective tool for improving the teaching and learning process.

The following information is being collected from you only to demonstrate that the sample of instructors in this study is representative of the instructors in this institution. Write in the appropriate letter on the answer sheet.

61. Gender	(A) Male	(B) Female		
62. Age	(A) 25-35	(B) 35-45	(C) 45-55	(D) 55+
63. Educational Background	(A) Journeyman	(B) Technical Diploma	(C) Bachelor's Degree	(D) Post graduate degree
64. Number of Years Teaching Experience	(A) 0 - 3 years	(B) 4 - 6 years	(C) 7 - 10 years	(D) 10+ years
65. Division	(A) Industrial	(B) Health Sciences	(C) Engineering Technologies	(D) Business

Modified College and University Classroom Environment Inventory (CUCEI) - Student Participant

Answer Sheet

Please fill in your responses to the CUCEI on the response form below.

This form of the questionnaire assesses your opinion about what this class is actually like. Indicate your opinion about each questionnaire statement by filling in the appropriate boxes on the response form with the letter of your choice.

Write A if you STRONGLY AGREE that the statement describes what this class is actually like

Write B if you AGREE that the statement describes what this class is actually like

Write C if you DISAGREE that the statement describes what this class is actually like

Write D if you STRONGLY DISAGREE that the statement describes what this class is actually like

1. ☐	8. ☐	15. ☐	22. ☐	29. ☐	36. ☐
2. ☐	9. ☐	16. ☐	23. ☐	30. ☐	37. ☐
3. ☐	10. ☐	17. ☐	24. ☐	31. ☐	38. ☐
4. ☐	11. ☐	18. ☐	25. ☐	32. ☐	39 ☐
5. ☐	12. ☐	19. ☐	26. ☐	33. ☐	40. ☐
6. ☐	13. ☐	20. ☐	27. ☐	34. ☐	41. ☐
7. ☐	14. ☐	21. ☐	28. ☐	35. ☐	42. ☐

Student Participant Answer Sheet - Page 2

Write A if you STRONGLY AGREE that the statement describes what this class is actually like

Write B if you AGREE that the statement describes what this class is actually like

Write C if you DISAGREE that the statement describes what this class is actually like

Write D if you STRONGLY DISAGREE that the statement describes what this class is actually like

43. ☐
44. ☐
45. ☐
46. ☐
47. ☐
48. ☐
49. ☐
50. ☐
51. ☐
52. ☐
53. ☐
54. ☐
55. ☐
56. ☐
57. ☐
58. ☐
59. ☐

Name:_____

Modified College and University Classroom Environment Inventory (CUCEI) - Faculty Participant Answer Sheet

Please fill in your responses to the CUCEI on the response form below.

This form of the questionnaire assesses your opinion about what this class is actually like. Indicate your opinion about each questionnaire statement by filling in the appropriate boxes on the response form with the letter of your choice.

Write A if you STRONGLY AGREE that the statement describes what this class is actually like

Write B if you AGREE that the statement describes what this class is actually like

Write C if you DISAGREE that the statement describes what this class is actually like

Write D if you STRONGLY DISAGREE that the statement describes what this class is actually like

1. ☐	8. ☐	15. ☐	22. ☐	29. ☐	36. ☐
2. ☐	9. ☐	16. ☐	23. ☐	30. ☐	37. ☐
3. ☐	10. ☐	17. ☐	24. ☐	31. ☐	38. ☐
4. ☐	11. ☐	18. ☐	25. ☐	32. ☐	39 ☐
5. ☐	12. ☐	19. ☐	26. ☐	33. ☐	40. ☐
6. ☐	13. ☐	20. ☐	27. ☐	34. ☐	41. ☐
7. ☐	14. ☐	21. ☐	28. ☐	35. ☐	42. ☐

Faculty Participant Answer Sheet - Page 2

Write A if you STRONGLY AGREE that the statement describes what this class is actually like

Write B if you AGREE that the statement describes what this class is actually like

Write C if you DISAGREE that the statement describes what this class is actually like

Write D if you STRONGLY DISAGREE that the statement describes what this class is actually like

43.	50.	57.	61.
44.	51.	58.	62.
45.	52.	59.	63.
46.	53.	60.	64.
47.	54.		65.
48.	55.		
49.	56.		

Modified College and University Classroom Environment Inventory (CUCEI) - Control Student Answer Sheet

Please fill in your responses to the CUCEI on the response form below.

This form of the questionnaire assesses your opinion about what this class is actually like. Indicate your opinion about each questionnaire statement by filling in the appropriate boxes on the response form with the letter of your choice.

Write A if you STRONGLY AGREE that the statement describes what this class is actually like

Write B if you AGREE that the statement describes what this class is actually like

Write C if you DISAGREE that the statement describes what this class is actually like

Write D if you STRONGLY DISAGREE that the statement describes what this class is actually like

1. ☐	8. ☐	15. ☐	22. ☐	29. ☐	36. ☐	43. ☐
2. ☐	9. ☐	16. ☐	23. ☐	30. ☐	37. ☐	44. ☐
3. ☐	10. ☐	17 ☐	24. ☐	31. ☐	38. ☐	45. ☐
4. ☐	11. ☐	18. ☐	25. ☐	32. ☐	39. ☐	46. ☐
5. ☐	12. ☐	19. ☐	26. ☐	33. ☐	40. ☐	47. ☐
6. ☐	13. ☐	20. ☐	27. ☐	34. ☐	41. ☐	48. ☐
7 ☐	14. ☐	21. ☐	28. ☐	35. ☐	42. ☐	49. ☐
	50. ☐	51. ☐	52. ☐			

Modified College and University Classroom Environment Inventory (CUCEI) - Control Faculty Answer Sheet

Please fill in your responses to the CUCEI on the response form below.

This form of the questionnaire assesses your opinion about what this class is actually like. Indicate your opinion about each questionnaire statement by filling in the appropriate boxes on the response form with the letter of your choice.

Write A if you STRONGLY AGREE that the statement describes what this class is actually like

Write B if you AGREE that the statement describes what this class is actually like

Write C if you DISAGREE that the statement describes what this class is actually like

Write D if you STRONGLY DISAGREE that the statement describes what this class is actually like

1. ☐	8. ☐	15. ☐	22. ☐	29. ☐	36. ☐	43. ☐
2. ☐	9. ☐	16. ☐	23. ☐	30. ☐	37. ☐	44. ☐
3. ☐	10. ☐	17 ☐	24. ☐	31. ☐	38. ☐	45. ☐
4. ☐	11. ☐	18. ☐	25. ☐	32. ☐	39. ☐	46. ☐
5. ☐	12. ☐	19. ☐	26. ☐	33. ☐	40. ☐	47. ☐
6. ☐	13. ☐	20. ☐	27. ☐	34. ☐	41. ☐	48. ☐
7 ☐	14. ☐	21. ☐	28. ☐	35. ☐	42. ☐	49. ☐
	50. ☐	51. ☐	52. ☐	53. ☐	54. ☐	

APPENDIX

C. Faculty Participant Questionnaire

Faculty Participant Questionnaire

1. Please list the Classroom Assessment Techniques (CATs) that you used this past semester?

2. Please list any of the CATs that you used more than once. Why were these used more than once?

3. Which of the CATs did you and your class find most helpful? Why?

4. Which of the CATs did you and your class find least helpful? Why?

5. What problem(s) or difficulty(s) did you experience using CATs?

6. What factor(s) allowed you to overcome the difficulty or problem?

7. In your opinion, did the use of CATs improve the quality of the teaching and learning in your class? Please give an example that would support your opinion.

8. Did you change your planned instruction due to the feedback received from students? If yes, please give a brief description of the change.

9. What factor(s) do you identify as **necessary** to support the effective use of CATs?

10. What factors do you identify as **helpful** to support the effective use of CATs?

11. Would you recommend the use of CATs to a colleague? Why or why not?

12. In your opinion, what was the greatest benefit(s) of using CATs?

13. In your opinion, what was the greatest drawback(s) of using CATs?

14. In your opinion, is CATs an appropriate tool for the improvement of the teaching and learning process in the classroom? Please comment in support of your opinion.

15. In your opinion, does the use of CATs heighten students awareness of problems and/or expectation of solutions and therefore cause students to act and react differently to the teaching and learning process? Please comment in support of your opinion.

APPENDIX

D. Permission to do Research at Cooperating Institution

NORTHERN ALBERTA INSTITUTE OF TECHNOLOGY

Date: May 1, 1995

To: Lee Bradshaw

From: Bill Spaans

MEMORANDUM

Re: **E. Soetaert Proposed Research Project**

Elaine Soetaert has requested support for a research project to be completed at NAIT. Her detailed proposal is attached. The proposed project has the following objectives and characteristics:

The study proposes to study faculty and student perceptions of the effectiveness of the Cross/Angelo Classroom Assessment Techniques (CAT) as a method for improving the teaching/learning process.

CAT is a procedure for collecting continuous feedback from students on the effectiveness of the instructional process in helping them to learn.

The research will be based on a sample of four instructors in each of the four instructional Divisions. A fifth instructor in each Division will be chosen as a control group for the study.

Instructors participating in the study will be randomly chosen from a list of instructors who volunteer to participate.

Program Head support will be obtained before the study commences. Instructors in the sample group will be trained in the use of CAT, during May, 1995. Data collection will occur during the period September to December, 1995.

CAT has previously been shown at other institutions to have a positive effect on student retention, grades and satisfaction. The research project findings will provide a valuable source of data on the use of CAT at NAIT.

I recommend support for this project. I believe it is consistent with NAIT's commitment to monitor and improve the effectiveness of the teaching/learning process. Participation in the project will be voluntary, and student feedback will anonymous.

W. Spaans

WS/jlw

Enclosure

Approved: Lee F Bradshaw

APPENDIX

E. Classroom Assessment Techniques Training Materials

CLASSROOM ASSESSMENT
and
STUDENT LEARNING

Two-Day Faculty Workshop

Northern Alberta Institute of Technology

May 29 & 30, 1995

Susan Obler, Ph.D.

Addenda: Tom Angelo, Assessment Forum, AAHE, Washington, D.C.

WORKSHOP GOALS:

To develop an understanding of Classroom Assessment practices
To develop learning goals that fit your students and your curriculum
To plan a Classroom Assessment project for one class

AGENDA, DAY ONE:

8:30	Introductions and Goals
9:00	Classroom Assessment: Overview
9:30	Classroom Assessment Project Scenarios
10:30	Ideal Student Assessment Responses
11:30	Benefits and Barriers to Classroom Assessment
12:00	LUNCH
1:00	Scenarios for Responding to Student Feedback
2:00	The Student's Problem is Our Problem
3:00	Designing Student Learning Goals
3:45	Wrap-up, Assignment for Day 2
4:00	Day 1 Ends

AGENDA, DAY TWO:

8:30	Goals for the Day; Assignment Review
9:30	Planning a CATs Project for One Class
10:30	Cautions and Clarifications
11:30	Organizational Snags and Supports
12:00	LUNCH
1:00	More Planning: It's All in the Details
2:00	How Does Culture Affect Learning?
3:00	Going Public: How Will You Share Your Results?
3:45	Loose Ends
4:00	Workshop Ends

What is "Classroom Research"?

Classroom research is the systematic study, by faculty, of what and how their students are learning in a particular course.

What is "Classroom Assessment"?

Systematic use of simple classroom assessment tools provide anonymous student feedback on learning progress.

Sources:

Traditional Educational Research

Faculty Development

The Assessment Movement

CLASSROOM ASSESSMENT IS:

Learner-Centered; Faculty-Directed

Active-Learning Oriented

Driven By Course Goals and Curriculum

Intellectually Stimulating

An Integral Part of Effective Teaching

Useful for Documenting Learning Progress

Valuable and Engaging for Students

"CATs" are most useful when they:

fit the instructor's approach

fit students' learning needs

fit course material or skills

require critical thinking skills

require active learning

encourage student self-assessment

foster faculty/students learning together

Classroom Assessment works when we:

Give Clear Directions

Limit Tasks to 1-2 Minutes

Vary Their Types and Uses

Assess a Specified Goal

Report Results to Students

Review Results Across a Term

Keep Notes Along the Way

SIMPLE INDIVIDUAL CATs

goal matching: students/teachers

the one-sentence, main idea

the one-minute paper

a list of key concepts

clearest point; muddiest point

one concept; one question

direct para-phrasing

background knowledge probe

define terms; distinguish ambiguous terms

Application of concept or skill

Rating the ease of an assignment

COLLABORATIVE CATs

Adapted CATs above

blackboard or computer list of key concepts

round-robin paragraph (one sentence each)

the one-minute report on key ideas

CAVEATS AND GUIDELINES

- Think through your goals.
- What do you want students to DO?
- Start small; set limits on the time you can invest.
- Get feedback from colleagues on your progress.
- Be flexible and willing to try new approaches.
- Help students learn to give useful feedback.
- Share assessment results with students.
- Enjoy the process WITH your students.

CHANGING PARADIGMS IN TEACHING AND LEARNING

THEN	NOW
Teaching behaviors	Learning Behaviors
Passive learners	Active Learners
Teacher as Dispenser	Teacher as Coach
"Bitting" Material	Meta-Curriculum
Competitive	Collaborative
Tedious Tasks	Use Computers
Teachers Assess	Students Assess
Withhold Scaffolding	Provide Scaffolding
Prescribe	Empower

RIO HONDO COLLEGE, WHITTIER, CALIFORNIA
Teaching-Learning Center: Overview & Update
Spring, 1995
The Teaching-Learning Center

The TLC was formed in 1989 via funding by Title III and other grants in order to:

* Increase the focus on students: how they learn and how teaching affects learning
* Foster the uses of classroom innovation and new technologies for teaching and learning across disciplines and programs
* Increase awareness of how culture, diversity, and bias affect learning
* Support the use of Cross-Angelo Classroom Assessment Techniques
* Encourage the systematic study of learning and teaching
* Develop, share models of piloting & assessing innovations directly with students

Spring, 1995 Pilot Projects

Rio's new Title III project (1994-99) is developing, through the TLC, a program to increase student persistence that we call Learning Communities. It's focus is developing increased contact among students and faculty in spite of a commuter campus; this contact will be supported by new learning technologies such as electronic class discussions. (The federal grant also provides for a Decision-Support System on the main frame which links faculty, managers, staff, and students to planning and assessing student & college needs.)

The current courses using electronic conferencing for class discussions are:

Micro Economics, Andy Howard - Career Orientation, Katie O'Brien
Mexican Literature, Mary Ann Pacheco - Astronomy, Dewayne Highfill
Comparative Government, Owen Newcomer - English, Lenore Dowling
Literature, Art Apprec, Sheila Lynch, Jim Matthis - Sociology, Tom Waller

Student and Faculty Access to New Technologies

The TLC has two primary lab areas for students and faculty to test new uses of interactive software and communications system: S-203 with 7 networked multi-media computer stations and S-202 with 21-stations for the classroom learning, for Internet access, and for electronic meetings. We also have 5 work stations in an adjoining alcove of S-203 for faculty to develop software, use class records software, and learn existing programs across programs or courses. The TLC expects to:

* Increase the uses of new technologies for student learning where appropriate.
* Expose faculty to the student learning possibilities for these new technologies.
* Provide training and equipment access for developing & adapting new technologies.

Electronic Meetings and On-Line Discussions, Internet Access

* Ventana's GroupWare for WINDOWS serves the needs of groups-both classes and committees-to brainstorm, sort ideas, assess alternatives, draft projects. Group members use these tools simultaneously and anonymously, using time more productively and diffusing the politics of meetings or class discussions.
* Via guests of BESTLA, California State University, Los Angeles, we provide Internet e-mail accounts to staff and students in our pilot courses and use VAXNotes for class discussions.

The "Large Format" Pilots

Co-sponsored by the TLC, Academic Affairs, we are in our second semester of using TLC labs for multi-media uses supplementing Economics and Psychology courses. Andy Howard and Judi Henderson have developed extensive presentations and interactive quizzes to personalize the larger classroom format. In Spring, 1995, one of Dr. Howard's courses will add on-line discussions to increase learning and to build community among students in such a large-enrollment class.

Title III Support: 1987-Present

First: 1987-1992: Rio's First Title III supported development of matriculation support for students, the Teaching-Learning Center, development of the mainframe for MIS reporting, the Multi-Cultural Center, and the Foundation.

Second: 1989-1994: The Title III Consortium allowed Rio, as the lead college, Mt.SAC, Cerritos, Rancho Santiago to develop a model to pilot innovative teaching and learning directly in the classroom.

Third: The current projects, described first, above.

Classroom Assessment (CATs = Classroom Assessment Techniques)

Classroom Assessment, as developed by Tom Angelo, Assessment Forum, MHE, and Pat Cross, University of California at Berkeley, is a way to find out if students are learning what we say we are teaching. In various ways - 3 X 5 cards, GroupWare, faculty-designed multi-media, or on-line conferences - students respond anonymously to brief questions about how and what they are learning in a particular course. For example, depending on his or her goals, the instructor might ask students to state the clearest/muddiest points in a lecture, or have students write a one-sentence definition of a key point. Faculty tabulate responses (by hand or electronically) to get a sense of how students are doing as a group. Then they report assessment results back to students. Through this process, faculty report that students are more engaged in learning; students report that they learn more when using these tools. Classroom assessment was a key feature in common across all three Title III-sponsored projects of the Teaching-Learning Center.

Links: the Teaching-Learning Center, Professional Development, FLEX

The TLC, Professional Development, and the FLEX requirement program work cooperatively (and share offices) to expand the goals of each and to:

* Increase student learning through the professional growth and training of faculty and staff.
* Encourage faculty and staff to strengthen their work through technology.
* Strengthen the contributions of each program while reducing inappropriate overlaps.
* Increase the cost effectiveness for all of the above.
* Conduct intensive courses for the awareness of current research and practice for new faculty hires.

Rio Hondo College
TEACHING-LEARNING CENTER ELECTRONIC FORUM PROJECT
Spring, 1995

What is the purpose of electronic conferences?

* To increase contact among students and instructors.
* To encourage collaborative learning.
* To provide a forum for discussing course ideas and skills.

Which classes are using on-line conferences in the Spring 1995 pilot?

MICROECON - RIO, Andy Howard -- COUNSELING101 - RIO, Katie O'Brien
MEXICANLIT117, Mary Ann Pacheco -- ASTRONOMY110, Dewayne Highfill
COMPGOVT - RIO, Owen Newcomer -- ENGLISH101 - RIO, Lenore Dowling
ARTLIT - RIO, Sheila Lynch, Jim Matthis -- SOCIOLOGY101, Tom Waller

How is it different from class discussions or study groups?

* On-line discussions allow students to enter their ideas and read others' at their own pace from college labs or from an off-campus computer and modem.
* As students think about what to write on line, they will be more engaged in the course material and they will also learn from a range of other opinions.
* Electronic discussions are often easier for those who dislike speaking in class or in groups; some people feel freer writing on the screen.
* Students and faculty share in the learning process; both enter topics for discussion and submit responses.
* All participants can use the other resources of the Internet -libraries, data bases, and colleagues around the world - in the conversations and debates on line.

NOTE: We are the first community college in California to use electronic conferences in this way. We found the on-line forum at the Maricopa Colleges in Phoenix, Arizona, where over 8000 students in over 350 courses use their Electronic Forum. Karen Schwalm, the Coordinator of their forum, is the trainer and evaluator for our project at Rio Hondo.

"ON THE INFORMATION HIGHWAY, YOUR MILEAGE MAY VARY."

USING AND ASSESSING LEARNING ON-LINE
"Virtual Classrooms; Virtual CATs"

Students use on-line (Internet) networks to

* engage in informal discussions of class issues.
* participate in directed discussions of course issues
* locate research material for term papers or projects
* discover ideas from other people, other cultures
* practice language for ESL students in any course
* construct and express knowledge through writing
* develop ideas for projects and papers
* make contact with the instructor (virtual office hours)
* read course materials and syllabi
* give instructors feedback on course assignments
* develop portfolios of course assignments
* create an on-going record of discussions and study of course work
* increase application, reinforcement, expansion of ideas and skills through writing
* extend contact time with other students that is otherwise impossible
* use anonymous classroom assessment techniques for feedback on learning
* increase active learning and critical thinking

Instructors use on-line networks to

* provide feedback to students on their papers or projects
* provide assessment of student work or student discussion
* provide library and data base resources of the Internet for course assignments
* find out how students are doing and how they develop their thinking
* discuss issues with other faculty in US and around the world
* discover other teachers' approaches to their discipline or program
* direct discussion and focus students' thinking on course material
* use "extended class time" to increase knowledge together
* engage students in the social construction of knowledge
* distribute class notes, study/test questions, or overheads to students
* gather anonymous classroom assessment techniques (see below)

Faculty and students together with on-line networks

* share information and skills
* strengthen cross-cultural contact
* increase retention via on-line learning communities
* become active, cooperative learners
* save a lot of trees

Adapted Classroom Assessment Techniques assess on-line learning via

* anonymous sessions on BBS (bulletin boards) or conferences (VAX notes, etc.)
* well-designed prompts from instructors, very similar to CATs that would be given verbally or in writing in the "real" classroom, adapted from Angelo/Cross book
* Samples of on-line CATs:
  - -Review your E-mail folder of classroom notes and discussions and write a sentence or two about the most valuable discussion thread we have had this term and why it helped you learn.
  - -In VAX notes, enter a one or two-sentence comment about the easiest and hardest part of our test last week on Chapter 5.
  - -What aspects of using E-mail and on-line resources were the most difficult and how did you overcome this difficulty?
  - -Regarding the short story we read this week, with which character did you identify the most and why?
  - -In the lab assignment you did Tuesday, what new skills did you learn?
  - -When using the software "Moneywise," which risk calculation was the most applicable to a "real life" situation? Why? Can you think of other calculations that could be added to the program?
* Advantages of on-line CATs:
  - -Patterns in the responses are easier & faster to calculate (search strings
  - -Feedback on CATs responses can be issued on line
  - -Response entries can be printed up in full for class review if students like concrete, hard copy
  - -An on-going record of CATs are available on line for review for those with the password
  - -The range of CAT responses in one or more terms could be very useful for classroom research project

USING GROUP SOFTWARE FOR CLASSES & MEETINGS

Rio Hondo College, Whittier, California

WHAT IS "GROUPWARE"?

* Networked group software allows participants to work simultaneously and anonymously on an agenda or assignment
* A printout of all individual and group work is ready at session's end.

TOOLS AVAILABLE:

* Divergent Tools: Brainstorming, Idea Organization, Topic Commenter
* Convergent Tools: Alternative Evaluator, Group Writer, Outliner

TYPICAL USES:

* Students list alternatives and criteria for a complex issue and evaluate it
* Students record notes in "folders" for tests or study notes; have printed results
* Students list examples of a sensitive topic & share the anonymous information
* A college planning committee creates criteria on which to make budget reductions
* A consortium in economic development evaluates their past year and plans the next
* Community committees develop agenda, develop partnerships, prepare grants.

ADVANTAGES:

* Ideas are generated simultaneously so that productivity is increased.
* Anonymity reduces political nature of classrooms & meetings; all views are recorded.
* Ideas are evaluated on their merit, not who speaks the most or has the most power.
* Students who rarely speak in class--due to cultural values--have their voices heard.
* Students and other groups receive a printed copy or a disk before they leave.
* Entries, notes, and stats on group consensus is readily available.
* Notes of meeting progress can be saved and used in subsequent sessions.

CAUTIONS:

* A trained facilitator must work with session leader or teacher to manage the software.
* Time must be given to the goals and results expected in a given session.
* Using the software can reveal the ragged edges of poor planning or goal ambiguities.
* The software can be costly (10K and up) and the hardware/network must be 486+.

CLASSROOM ASSESSMENT TECHNIQUES:

* Adaptations of many Angelo/Cross CATs can assess group progress
* The simplest prompts work the best.
* In Topic Commenter, for example, 2 folders could be used, one labeled Clearest Point, the other labeled Muddiest Point.
* Groups rank the most useful assignments in a series with agreed-upon criteria.
* Often, we use a summary sentence or a one-minute paper at the end of a session.
* For techno-phobics, we stop work about 15 minutes into the session and use low-tech 3 X 5 cards to ask about problems with the system.

WORKING DEFINITIONS for

PRO-DIVERSITY, ANTI-BIAS GOALS

Curricular Goals

Pro-diversity: Increase the range of cultural information, sources, ideas, influences, and communities in the curriculum.

Anti-Bias: Reduce the negative imagery, limited information, and narrow views of marginal societal groups.

Pedagogical Goals

Pro-Diversity: Increase strategies that foster student communication across groups, expand range of teaching and learning styles, and support active learning of ALL students.

Anti-Bias: Reduce methods that alienate one group from another or limit learning of any given group.

ASSESSING PRO-DIVERSITY GOALS

Example: INTRODUCTION TO HEALTH CARE

LONG-RANGE PRO-DIVERSITY GOALS:

* To increase students' skills with patients of ALL cultural/socio-economic groups.
* To increase students' information on culturally-driven, patient beliefs and attitudes.

SHORT-TERM GOAL

Students will be able to demonstrate understanding of patient needs and appropriate health-care worker responses to those in cultures outside their own.

LEARNING ACTIVITY

In groups of 3-4, arranged across cultures, students discuss two health care scenarios which could stymie those from another culture. (For example, a middle-class, dominant-culture student interprets the use of a "curandera" as a patient's delay in getting "real" health care.)

PRO-DIVERSITY CAT

Students do a One-Minute Paper, individually or in groups, by responding to the following prompt: "In 2-3 sentences, describe an appropriate way to respond to the patient in one of the scenarios."

STUDENT RESPONSES

Before our discussion, I thought that an older Mexican lady who came to the emergency room with an advanced lesion was just denying her condition. Our group discussed the fact that she spoke Spanish, but understood some English. We decided that both culture and economics could affect her apparent "delay." Next time, I wouldn't ask why she waited so long; I would I listen to her fears, comfort her, and proceed with required procedures.

TEACHER RESPONSE

The teacher reports the range of cultures and socio-economic groups used in the scenarios, praising those that demonstrate appropriate responses. Copies of 2-3 of the most astute one-minute papers could be provided to all.

CLASSROOM ASSESSMENT OF PRO-DIVERSITY GOALS
Example: INTRODUCTION TO BUSINESS

LONG-RANGE PRO-DIVERSITY GOALS

*To increase students' awareness of cultural issues in business management.

*To exchange benefit from the diverse backgrounds of students in the class as their cultures relate to business issues.

SHORT-TERM GOAL

*To increase information and understanding about various cultural contributions to American corporate leadership development.

LEARNING ACTIVITY

Students listen to a 20 minute lecture by an executive from Toyota of North America. He emphasizes the contrasts between typical corporate expectations of leadership and the contrasts between Theory X and Theory Y as related to Japanese culture.

PRO-DIVERSITY CAT

Students do a One-minute Paper, by responding to the following prompt: "State in three to four sentences how Theory Y is affected by Japanese culture."

STUDENT RESPONSES

Theory Y includes the view that work is a spiritual thing, not drudgery that workers hate. That means that leaders can rely on workers' teamwork and personal investment in quality products.

I can't see how work can ever be fun. Maybe you just have to be raised that way. (My boss could never get it!)

TEACHER RESPONSE

One good example and one weak example of the one-minute papers are copied for all students and two inadequate responses are clarified in order to reduce misinformation about the theories. The teacher might mention current change in Japanese organizations; no cultural influence on leadership is static, any more than our adaptation is static.

FUNCTIONS OF CLASSROOM ASSESSMENT ACROSS TIME

WHEN	PURPOSES	EXAMPLE CATS
Course beginning	Assess knowledge	Knowledge Probe
		Misconception Check
	Assess interests	Interest Check
		Goal Ranking
	Assess confidence	Autobiographical Sketches
		Confidence Survey
Before a class	Improve study skills	Productive Study Log
	Support active reading	Word Journals
	Improve problem solving	Process Analysis
Start of a class	Class-to-class transition	RSQC2
	Set coverage priorities	Focused Listing
		Muddiest Point
Middle of a class	Assess listening	Punctuated Lecture
	Assess teaching	Chain Notes
End of a class	Assess content communication	Empty Outlines
	Promote elaboration	Application Cards
After a class	Promote learning integration	Directed Paraphrase
	Promote critical thinking	Invented Dialogue
After a unit	Assess student reactions	Minute Paper
	Promote synthesis	Group Feedback, SGID
		Generated Questions
		Paper Prospectus
After a course	Assess student opinions	Feedback Form
		Course Evaluations

Note: *CATs used to collect data before or at the start or a course, unit, or class day can be repeated to assess changes in student characteristics, opinions, and performance after a course, unit, or class day.*

A Hierarchy of Higher Education Assessment: Types and Levels

Types of Assessment	Level(s) on which Assessment Focuses
System-wide	State community college, four-year, or university systems
Institutional	Individual college or university
Program Review/ Program Evaluation	School, program, or department
Classroom Research	Individual course
Classroom Assessment	Individual class meeting or assignment within a specific course

FIVE DIMENSIONS OF HIGHER LEARNING

DECLARATIVE LEARNING

Learning *What*

Learning facts and principles

PROCEDURAL LEARNING

Learning *How*

Learning skills and procedures

CONDITIONAL LEARNING

Learning *When and Where*

Learning applications

REFLECTIVE LEARNING

Learning *Why*

Learning to understand one's self

METACOGNITIVE LEARNING

Learning *How to Learn*

Learning to manage one's learning

Pro and Con Grid

DIRECTIONS: **Considering everything you know about Classroom Assessment at this point, what do you see as the most important *pros* and *cons*, or costs and benefits of using this approach. List at least three important *cons* (costs) and at least three *pros* (benefits) below.**

Cons / Costs of using Classroom Assessment

Pros / Benefits of using Classroom Assessment

Reference: Angelo, T. A. & Cross, K. P. Classroom Assessment Techniques: A Handbook for College Teachers, 2nd edition. San Francisco: Jossey-Bass, 1993, pp. 168-171.

Applications Card

DIRECTIONS: **Please take a moment to recall the ideas, techniques, and strategies we've discussed - and those you've thought up - to this point in the session. Quickly list as many possible applications as you can. Don't censor yourself! These are merely possibilities. You can always evaluate the desirability and/or feasibility of these application ideas later.**

Interesting IDEAS/TECHNIQUES from this session	*Some possible APPLICATIONS of those ideas, techniques to my work*

Directed Paraphrasing

First, in 1 or 2 concise sentences, define (or explain or describe) what (an Important concept in your course) is so that (a type of client, customer, patient, etc.) will understand you clearly. Make sure your paraphrase is both accurate and appropriate to your audience.

Second, paraphrase that same concept again, but this time for(a second, very different type of client, customer, patient, etc.) Make sure your second paraphrase is just as accurate as the first, but appropriate to the new audience.

What did you change when you created the second paraphrase? Why?

Reference: Angelo, T.A. & Cross. K.P. Classroom Assessment Techniques A Handbook for College Teachers, 2nd edition. San Franciso: Jossey-Bass, 1993, pp. 232-235

Focused Listing

Select one of your courses to focus on. From that course, choose one central concept that your students must understand in order to master the material. Consider using this technique to assess students' understanding of that concept. To prepare, list several words or short phrases that you use to describe or define (fill in blank with that central concept from your course). You can then compare students' responses to yours.

Reference: Angelo, T.A. & Cross, K.P. Classroom Assessment Techniques: A Handbook for College Teachers, 2nd edition. San Franciso: Jossey-Bass, 1993, pp. 126-131.

The Minute Paper

Please answer each question in 1 or 2 sentences:

1) What was the most useful or meaningful thing you learned during this session?

2) What question(s) remain upper-most in your mind as we end this session?

Reference: Angelo, T.A. & Cross, K.P. Classroom Assessment Techniques: A Handbook for College Teachers, 2nd edition. San Francisco: Jossey-Bass, 1993, pp. 148-153.

T. A. Angelo - Phase 11 C R. Project - 6/94

Political Science 100, Section 20 - T.A. Angelo -1/28/91

Background Knowledge Probe #l

In response to each name, term, or concept in bold print below, circle the number that best represents your current knowledge:

1. Federalism

(1) Have never heard of this	0
(2) Have heard of it, but don't really know what it means	14
(3) Have some idea what this means, but not too clear	15
(4) Have a clear idea what this means and can explain it	1

2. Separation of Powers

(1) Have never heard of this	1
(2) Have heard of it, but don't really know what it means	6
(3) Have some idea what this means but not too clear	18
(4) Have a clear idea what this means and can explain it	5

3. Republic

(1) Have never heard of this	0
(2) Have heard of it, but don't really know what it means	5
(3) Have some idea what this means, but not too clear	23
(4) Have a clear idea what this means and can explain it	2

4. The *Constitution* of the U. S.

(1) Have never heard of this	0
(2) Have heard of it, but don't really know what it means	2
(3) Have some idea what this means, but not too clear	8
(4) Have a clear idea what this means and can explain it	18

5. The *Articles of Confederation*

(1) Have never heard of this	7
(2) Have heard of it, but don't really know what it means	13
(3) Have some idea what this means, but not too clear	6
(4) Have a clear idea what this means and can explain it	4

6. **James Madison**

(1) Have never heard of this person	3
(2) Have heard of him, but don't really know who he was	8
(3) Have some idea who this was, but not too clear	15
(4) Have a clear idea who this was and can explain	4

Introductory Statistics Example

Background Knowledge Probe

In response to each problem below, circle the number (1-4) that best represents your current knowledge. If you circle (4), please go ahead and solve the problem.

I. Suppose that you have a bag of M&M candies (plain, no peanuts) that contains 22 light brown, 20 dark brown, 18 yellow, 14 green, 12 orange, and 11 red M&Ms. If you draw one of these M&Ms out at random, what are the probabilities that it will be:

(a) yellow? (b) red? (c) neither yellow nor red?

(1) I have no idea how to solve this problem
(2) I once knew how to solve problems like this, but have forgotten
(3) I think I could solve it, given enough time
(4) I'm sure I can solve it right now

II. In Smallville, 8% of all adults over 50 have diabetes. If a clinic in this community correctly diagnoses 95 percent of all persons with diabetes as having the disease, and incorrectly diagnoses 2% of all persons without diabetes as having the disease. What is the probability that an adult over 50 diagnosed by this clinic as having diabetes actually has the disease?

(1) I have no idea how to solve this problem
(2) I once knew how to solve problems like this, but have forgotten
(3) I think I could solve it, given enough time
(4) I'm sure I can solve it right now

III. In Lost Wages, Nevada, incompatibility is given as the reason for 60% of all divorces. What is the probability that three of the next six divorce cases filed in this city will claim incompatibility as the reason? (Use the attached table)

(1) I have no idea how to solve this problem
(2) I once knew how to solve problems like this, but have forgotten
(3) I think I could solve it, given enough time
(4) I'm sure I can solve it right now

BENEFITS AND BARRIERS

Please make three lists for this part of the discussion.

1. The benefits to students of using classroom assessment:

2. The benefits to faculty/teachers of using classroom assessment:

3. The barriers to using classroom assessment:

NOTES:

DESIGNING STUDENT LEARNING GOALS

1. Individually, list the signs or evidence of student learning (outside of tests) that you watch for in one class you usually teach each year.

2. Share the list of signs of learning with your colleagues. Then write out one goal using two or three of those signs as specific learning goals:

3. Together, review the list of CATs in the handouts, video, or discussion thus far. Use your colleagues' help in choosing one or two CATs you could use to assess the goal above:

Which of your own signs of learning, goal statements, and assessment techniques are similar to your colleagues'? Which are distinct? Why?

NOTES:

DRAFTING SIMPLE CATs FOR ONE CLASS

Identified Course:

1. LONG-RANGE LEARNING GOALS (3-4 student learning goals)

2. SHORT-TERM GOAL (Specify what students should write, say, demo in this class)

3. LEARNING ACTIVITY (what will they be doing; what will you be doing)

4. SPECIFIC 3 or 4 CATs YOU COULD ADAPT

5. IDEAL STUDENT RESPONSES (what you hope they will say on the CATs)

6. YOUR RESPONSE IF THE CATs ARE POSITIVE:

7. YOUR RESPONSE IF THE CATs ARE NOT AS POSITIVE:

8. YOUR RESPONSE IF THE CATs ARE AMBIGUOUS:

PRO-DIVERSITY LEARNING GOALS & ASSESSMENT PLANNING SHEET

Course:

1. A LONG-RANGE PRO-DIVERSITY COURSE GOAL (for a term or a large unit)

2. A SHORT-TERM GOAL (...for one class or a clinical setting for about an hour)

3. A PRO-DIVERSITY LEARNING ACTIVITY (What will students actually do?)

4. A SPECIFIC CAT (adapted one that fits the pro-diversity goal)

APPENDIX

F. Results of Participant Faculty Questionnaire

Note researcher comments are enclosed in [ ] brackets

1. List the Classroom Assessment Techniques that you used this past semester.

#1	Background Knowledge Probe	11
#4	Empty outlines	1
#5	Memory Matrix	1
#6	Minute Paper (Best and least clear points)	6
#7	Muddiest Point	7
#10	Pro and Con Grid	2
#13	One sentence summary	2
#16	Concept Mapping	1
#20	What's the principle?	1
#28	Classroom Opinion Polls	3
#32	Course Related Self-Confidence Survey	4
#43	Teacher designed feedback form	6
#44	Group Instructional Feedback Technique	1
#46	RSQC2	2
#47	Group-work Evaluation	1
#49	Assignment Evaluation	3
#50	Exam Evaluation	2

****

2. List CATs used more than once. Why were they used more than once?

Clearest/Muddiest point
short, simple effective tool to pick out problem areas
Gave me a "quick" perception check of student understanding on the particular topic or individual concept
easy to use
Opinion Poll
used more than once to see if there was any shift in opinion [pre and post test]
Two teacher designed feedback forms (re cooperative learning)
to assess student preferences and opinions on new delivery of instruction method
Memory Matrix/Minute Paper/ Muddiest Point/ One Sentence Summary
ease of use/ little preparation/ quick results
Muddiest Point/ Assignment assessments
they were quick and easy & provided info that I could act on quickly to direct the course. If I missed something, these let me know.

****

3. Which of the CATs did you and your class find most helpful? Why?

* The midterm feedback [this was an exam evaluation of the midterm exam] - with only the 8-9 people [this was a very small class] they always said "nice, good" things. Maybe there was not much they wanted changed. [I take this to mean that the CATs did not identify areas for improvement as was expected. It did however, reaffirm the instructor's approach.]
* Empty Outlines - The students felt that completing the outline after doing the reading forced them to focus on what they had read. They felt it was a good learning experience.
* Assignment Assessments - Because my course is primarily lab (90%), I needed feedback on their ongoing assignments (only 7 this semester). It's very difficult to watch 18 people working on individual projects and catch all their errors.
* Midterm Evaluation [this was an exam evaluation of the midterm exam] Students felt part of process of exam preparation and I know preferential questioning and how it enhanced learning.
* The combined Assignment Assessment and Self-Confidence Survey [this instructor combined these two CATs into one after giving the students a major, difficult, intricate and complicated technical assignment] helped to avert a morale problem and gave the students a psychological boost, when it was needed.
* Memory Matrix - help summarize large amounts of info. [This instructor teaches in respiratory technology and the students have masses of variables to keep track of in unison in the operation of various pieces of equipment. Also, the margin for error is almost non-existent because these people work in life-threatening situations.]
* All of them - [used groupwork evaluation, concept mapping, muddiest point and two teacher designed CATs re cooperative learning process.] The "process" ones helped us all to evaluate **cooperative** learning. The muddiest point helped me to learn which concepts needed review.
* Muddiest Point - short, simple effective tool to pick out problem areas.
* Course Related Self-Confidence Survey - It gave them [the students] an idea of how much they knew or did not know - and it helped me to focus on those things.

****

4. Which of the CATs did you and your class find least helpful? Why?

* Opinion Poll - because the opinion was on something we had no control over. [This instructor needed to think further ahead to ask "what will I do with the information I get from this CATs.]
* None - All were helpful.
* All useful
* The Minute Paper (I) most important thing learned, ii) unanswered questions) was too rushed, with insufficient explanation to the students. Even so, it did produce some responses that were worth discussing with the group. [Instructor did not allot enough time. This was his second CATs after the Background Knowledge Probe. He was inexperienced and thought the "paper" could really be done in a minute. Also, the

students were not as yet well-trained in completing a CAT and were not yet sure if their input would be "heard."]

* Pro and Con Grid - Very helpful for the "pro" but very few helpful or insightful responses on the "con" side. Possibly students were apprehensive in general to comment (in their opinion) negatively. [Here we see a typical class where the trust has not yet been established - they fear reprisal or they don't want to hurt the instructor's feelings. The culture of the class has to be developed to the point where students realize that feedback (criticism, critique, negative) is used as a base for improvement - not as punishment!]
* Opinion Polls - I received a lot of feedback that had nothing to do with the course - more personal in nature; things that I couldn't really change. [Again, the instructor needs to ask the right question, focus in the right area or at the very least, respond honestly about what they can and cannot change. Sometimes students take an assessment as an opportunity to express something that they would not normally communicate to the instructor. Perhaps this is what happened here. They just wanted the instructor to know about the issue - not that they expected her to do anything about it!]
* Assignment Evaluation. We didn't receive enough information from the questions asked to be able to make any real change. [I would be interested to see the questions asked because they were probably quite general in nature. If we want to know about something specific, we need to ask a specific question!]
* They were helpful if the students were honest.

{{**Summary** It would seem that the faculty need some help, practice, experience, etc. in asking good questions, in the appropriate form and at the right time. This process of having responses come back that are not really helpful - if instructors are introspective and honest - should enable them to sharpen their critical thinking skills and ask better questions that align with their goal in asking the question!!!!}}

****

5. What problem(s) or difficulty(s) did you experience using CATs?
6. *What factor(s) allowed you to overcome the difficulty or problem?*

* None. *N/A*
* Small class - no "negative" feedback that identified a need for change. *Just smiled and did another one.*
* Sometimes students do not complete the CATs as diligently and completely as I would like. Human nature seems to play a role in "evaluations are more work for me to do." *Once the students see that their comments make a difference in the classroom, they are more willing to make detailed comments.*
* Had to be very specific or you got all kinds of info! Sometimes, I asked for feedback too soon and they didn't know yet, what they didn't know! *Learned to ask specifics and phrase questions to obtain the info I wanted, somewhat.*
* Students very receptive. My problem was in the preparation and analysis time required for each CAT. *Time management*
* Insufficient planning (by myself) on which CATs to use and when - they were used in preparation for our CAT group meetings, rather than being incorporated into the course planning. Also, content packed courses with little time to "waste." *An ability to*

"scramble"/ react quickly. Choosing some CATs that required LOW levels of faculty/student energy and time.

* Making time. Felt like a lot of work. *(Reminded myself that) the student does benefit.*
* Building it into the lesson. Time factor. Analysis later was time consuming. *Elaine's (Researcher's) expectations that I would use CATs helped me to ensure I used them. I learned to do the analysis more effectively over time.*
* Stating a question which is specific enough to get valid feedback. *Thinking about how the students might answer.*

****

7. In your opinion, did the use of CATs improve the quality of the teaching and learning in your class? Please give an example that would support your opinion.

* Yes
* YES. The muddiest point CAT, for example allowed us to go back and clear up areas where students were struggling.
* yes, especially with respect to the new process of coop(erative) learning. - also the muddiest point was helpful re content and review.
* Yes - self-confidence survey told (showed) me that I forgot to teach a skill.
* Yes - they provided feedback which I can use to direct future instruction (e.g. my sixth CAT - teacher designed feedback form). - they helped students to consolidate information (minute paper/pros-cons) and reflect on their experiences and strengths (assignment assessment/self-confidence survey.)
* Yes. Students felt their opinion was valued and important, therefore increased commitment to being in class and being successful.
* Yes, at the start of semester, I was going too fast, I didn't realize how much the material would need to be broken down. - the CATs made it clear which areas needed to be emphasized.
* Yes!! The RSQC2 showed that during the class surveyed, most students were confused. I used this information and went back to the class & revisited the area that was causing confusion.
* Yes. If nothing else, I told the students they could provide feedback. - They said they liked the quote on the board [This instructor puts a thought-provoking quote on the blackboard each day.] It made me look for more quotes. [This is the instructor with the small class who did not point out any areas for improvement.]

****

8. Did you change your planned instruction due to the feedback received from students? If yes, please give a brief description of the change.

* In some instances - they wanted more student involvement - I am now trying to give them that.

* Yes! I postponed teaching a new lesson until the "confusing material" was cleared up and the students felt comfortable.
* Yes, I gave more detailed instructions (written) & tried to do more demo's.
* I made several changes throughout (the) semester as a result of the feedback. Changes: 1) exam preparation, 2) more classroom discussion.
* No, but the feedback confirmed some future directions that I want to incorporate.
* Yes, more time on review.
* Yes - I'll be reviewing certain theories before the final exam & I might not have done so otherwise.
* Somewhat - would review past material if necessary, but without CAT may not have done this.
* Yes, I looked for more quotes [for the blackboard]. Nobody asked for changes other than less homework - but we need the homework. [This instructor did not choose to change something that the students requested because in his judgment, it would not aid their learning.]

****

9. What factor(s) do you identify as necessary to support the effective use of CATs?

* - instructor commitment - student feedback and interest
* Trust between instructor and student - the instructor being open for (to) change.
* Must report results back to the class - results must be meaningful (need to design CAT effectively.)
* The book, Classroom Assessment Techniques (or other???) **and** a training course of at least one day in length.
* Student support
* Pre-planning - design instruction with specific CATs included in the lesson/unit plans.

  Sufficient Time - preparation/student energy/ evaluation

  Instructor Attitude (openness) - instructor must value the process and share responses (+ and -) with the class.
* 1. Open communication with students. 2. Ongoing feedback.
* - must be able to make changes due to feedback. - good instructor to student relationship.
* 1. Willing instructor who is strong enough to take the heat if students have constructive criticism.

  2. Planned CATs time - worked into lecture or lab time.

****

10. What factor(s) do you identify as helpful to support the effective use of CATs?

* Administrative support and encouragement.
* Management support is helpful

* If it was commonplace, the students would be used to it, better prepared as to what is expected from them.
* 1) Student input on alternative forms of CAT 2) Student "Buy In" to process.
* - further experience/comfort with a repertoire of CATs - willingness to experiment - both students and instructor.
* support group
* 1] support group 2] follow-up training/debriefing in the next year to compare notes/ideas.
* having resource book to find ideas and examples.
* classes larger than 10

****

11. Would you recommend the use of CATs to a colleague? Why or shy not?

* Yes. I felt that it helped to improve the class and also helped build rapport with the students.
* Yes. I think it can and does help in the class.
* YES. I believe it to be an enhancement to the learning process.
* Yes - improves the atmosphere in the class & the trust level between me & my students. As well, I get honest feedback re content knowledge.
* Yes. Results are invaluable.
* Yes - it provides on-going communication with the students on the effectiveness of instruction.
* Yes. Provides instant feedback to student and instructor.
* Yes, its great to get an overall view of the class attitude & thinking, they will write things they would never say.
* Yes, but only if the colleague was serious about taking the time to do them, and felt secure enough to really be willing to change their lessons to improve their classes.

****

12. In your opinion, what was the greatest benefit(s) of using CATs?

* - Immediate feedback which allowed for immediate response!
* - getting honest feedback overall, & even some praise!
  - kept things in perspective, usually it was only a few who weren't "getting it," not the whole class.
* feedback received
* Improved communication between students and instructor, leading to better learning climates.
* Better education for the student.
* Improves the atmosphere in the class & the trust level between me & my students. As well. I get honest feedback re content knowledge.
* Involves the class more and makes their opinions count for something.
* Instant feedback from the students.

* Increased awareness of the distance there can be between what I perceive I am teaching and the students are learning and what they are actually learning.

****

13. In your opinion, what was the greatest drawback(s) of using CATs?

* Preparation of the CATs ahead of time - it didn't take long, but it's one of those things that goes to the bottom of the list.
* In one case, the feedback suggested changes that I couldn't make, I wasn't sure how to deal with that.

One student in my class is difficult to deal with at the best of times & writes unnecessary comments

* Time commitment
* Time constraints due to content-learning courses and increased instructor workloads. [This academic year was a year of heavily increased workloads and larger class sizes for instructors. So in the midst of trying to adapt to those changes they were also trying to find the time to work with CATs. - A challenge!]
* None - Benefits out weighed any inconveniences.
* Time! - for administering and for analyzing

Also knowing which CAT to use.

* None, really
* Some instructor may take the feedback wrong [This is a concern that "someone else" might respond defensively.]
* Finding the time to effectively plan the CATs into lessons and respond to the students

****

14. In you opinion, is CATs an appropriate tool for the improvement of the teaching and learning process in the classroom? Please comment in support of your opinion.

* Yes.
* Yes. Anything that provides communication between instructor and student is good.
* Yes. Involves the class more and makes their opinions count for something.
* Yes. Improves the atmosphere in the class & the trust level between me & my students. As well, I get honest feedback re content knowledge.
* Absolutely.
* Yes - with sufficient planning to include CATs, they can be used without severe time allotments. They are convenient and simple assessment tools.
* Yes. It tends to encourage trust and communication.
* Yes, I need to know if they are learning what they have to and students must feel involved & responsible for their learning - If they are taking part in it and can see changes, they become more involved.

* YES. If an instructor truly desires to improve teaching & learning in the classroom, CATs provides the tools that can be used to implement and measure the processes. Its so great to have all these ideas in a book right at hand.

****

15. In your opinion, does the use of CATs heighten students awareness of problems and/or expectation of solutions and therefore cause students to act and react differently to the teaching and learning process? Please comment in support of your opinion.

* Yes
* Only if the students are made to feel that they are an integral & valuable part of a team (they & the instructor) whose goal is to improve teaching & learning and that there are no hidden agendas. When they reach that point, they "buy" into the process and learning becomes "**cooperative**."
* Yes, it makes them aware of the instructor's difficulties somewhat & if a solution is not simple, at least they are aware. - problems don't "magically disappear."
* Yes. If students are allowed to provide input on the learning process, they will generally strive to ensure they benefit from improvements and feel part of the process.
* Some of the CATs can be used to encourage students' understanding of why certain instruction/assignments were employed, while others encourage student processing of material learned. All of the CATs involve active, rather than passive, student involvement and this will encourage learning. Basically, the students become more involved in the process of learning through the use of CATs.
* Yes
* Yes - Improves the atmosphere in the class & the trust level between me & my students. As well, I get honest feedback re content knowledge
* In this class not necessarily, but I can see this as a possibility if CATs properly designed.
* Yes. It causes them to think about the problem & therefore a solution. - They may be aware of the whole class more.

****

APPENDIX

G. Advertisement for Control Faculty Participants

Classroom Assessment Techniques Study: At this moment, NAIT instructors are involved in applying Classroom Assessment Techniques to improve the teaching and learning experience. A study being conducted regarding these techniques requires a pool of volunteers to act as a control group. These control group participants will be drawn randomly from the pool of volunteers. Volunteers who are chosen will be asked to donate one hour of instructional time in November to the researcher for the purpose of administering the College and University Classroom Environment Inventory. All staff and student participants will remain anonymous. Instructors will receive the results of the inventory for their class.

This is an opportunity for you to contribute to the growing body of knowledge about the applicability of Classroom Assessment Techniques to the technical institution and to gain knowledge about your classroom environment. Please call Elaine Soetaert at 459-3133 to be included in the pool of volunteers. (This study has been approved by Research and Academic Development and has been accepted by the University of Alberta, Ethics Review Committee.)

APPENDIX

H. Permission to Use the College and University Classroom Environment Inventory

Message-Id: <19950221100n.AA06959@info.curtin.edu.au>
Date: Tue, 21 Feb 1995 18:00:37 +0800
To: elaines@nait.ab.ca
From: itreagus@info.curtin.edu.au (David Treagust)
Subject: CUCEI

95-02-21 03:01:17

Dear Elaine Soetaert

Many thinks for your letter of 30.1.95 regarding your interest in using the CUCEI for your research.

You certainly have our permission to use the instrument and we wish you well with your research. Do you have a copy of the instrument? If not we will be pleased to send you a copy.

Best wishes

David F Treagust

David F Treagust
Science and Mathematics Education Centre
Curtin University of Technology
GPO Box U1987
Perth Western Australia 6001
Australia
Phone: 61 9 351 7924
Fax: 61 9 351 2503

APPENDIX

I. Copyright Permissions

From: Myron Tribus <104055.2663@compuserve.com>
To: Elaine Soetaert <elaines@nait.ab.ca>
Date: Thursday, February 22, 1996 4:59 pm
Subject: Re: Permission to Reprint

Please go ahead and use the figures with my blessing.
Myron Tribus

From: <fraser@ccl2.eng.ohio-state.edu>
To: nait.ext("elaines@nait.ab.ca")
Date: Thursday, February 22, 1996 10:07 am
Subject: RE: Permission to Reprint

Elaine - I give you permission to reprint in your Master's thesis the table showing the congruence of TQM and ALT from the paper Fraser et al, 1994 ASEE proceedings. Please cite that paper on the page with the thesis (that way , if the table gets copied from your thesis by someone else, the citation goes with it.)

Thank you very much for asking for permission.

As a favor, could you let me have a copy of your thesis when completed? electronic version? or point me to web site? as last resort, would you mind sending me a printed copy? I realize that may be a burden, but it sounds like a *very* good study.

Thanks again.

Jane fraser.1@osu.edu

From: Mimi Harris Steadman <steadman@garnet.berkeley.edu>
To: Elaine Soetaert <elaines@nait.ab.ca>
Date: Saturday, February 24, 1996 3:21 pm
Subject: Re: Copyright permission

Dear Elaine,

Please feel free to reprint any tables from my dissertation Implementation and Impact of Classroom Assessment Techniques. I am pleased you have found my research valuable in your thesis efforts!

Sincerely,

Mimi Harris Steadman
Graduate School of Education
UC Berkeley

APPENDIX

J. Items Added to the College and University Classroom Environment Inventory

MODIFIED COLLEGE AND UNIVERSITY CLASSROOM ENVIRONMENT INVENTORY (CUCEI) STUDENT PARTICIPANT - ITEMS ADDED TO THE ORIGINAL CUCEI

50. Classroom assessment is a waste of time.
51. Classroom assessments allowed me to communicate in a positive way with my instructor.
52 If I had a choice, I would choose to be in a class with an instructor who uses classroom assessments.
53 The use of classroom assessments had little or no effect on my learning.
54. The use of classroom assessments made me feel more involved in my learning.
55. The use of classroom assessments improved the quality of my educational experience in this class.
56. All instructors should use classroom assessments.

The following information is being collected from you only to demonstrate that this class's students are representative of students who attend this institution. Write in the appropriate letter on the answer sheet.

57. Gender	(A) Male	(B) Female		
58. Age	(A) 17-21	(B) 22-26	(C) 27-31	(D) 32+
59. Previous Education	(A) High School	(B) One Year Postsecondary	(C) Two Years Postsecondary	(D) Journeyman

MODIFIED COLLEGE AND UNIVERSITY CLASSROOM ENVIRONMENT INVENTORY (CUCEI) STUDENT PARTICIPANT - ITEMS ADDED TO THE ORIGINAL CUCEI

50. The use of Classroom Assessment Techniques (CATs) in my classroom contributed to an improvement in the teaching and learning process.
51. The use of CATs was difficult for me.
52. CATs is an easy tool to use.
53. The use of CATs is a time-consuming process.
54. I will use CATs again.
55. I plan to introduce CATs to all my classes.
56. I would recommend the use of CATs to a colleague.
57. The use of CATs made me feel more effective in the classroom.
58. I enjoyed the sharing of information with my colleagues in our CATs meetings.
59. I feel more excited about my teaching since I have started using CATs.
60. In my opinion, CATs is an effective tool for improving the teaching and learning process.

The following information is being collected from you only to demonstrate that the sample of instructors in this study is representative of the instructors in this institution. Write in the appropriate letter on the answer sheet.

61. Gender	(A) Male	(B) Female		
62. Age	(A) 25-35	(B) 35-45	(C) 45-55	(D) 55+
63. Educational Background	(A) Journeyman	(B) Technical Diploma	(C) Bachelor's Degree	(D) Post graduate degree
64. Number of Years Teaching Experience	(A) 0 - 3 years	(B) 4 - 6 years	(C) 7 - 10 years	(D) 10+ years
65. Division	(A) Industrial	(B) Health Sciences	(C) Engineering Technologies	(D) Business